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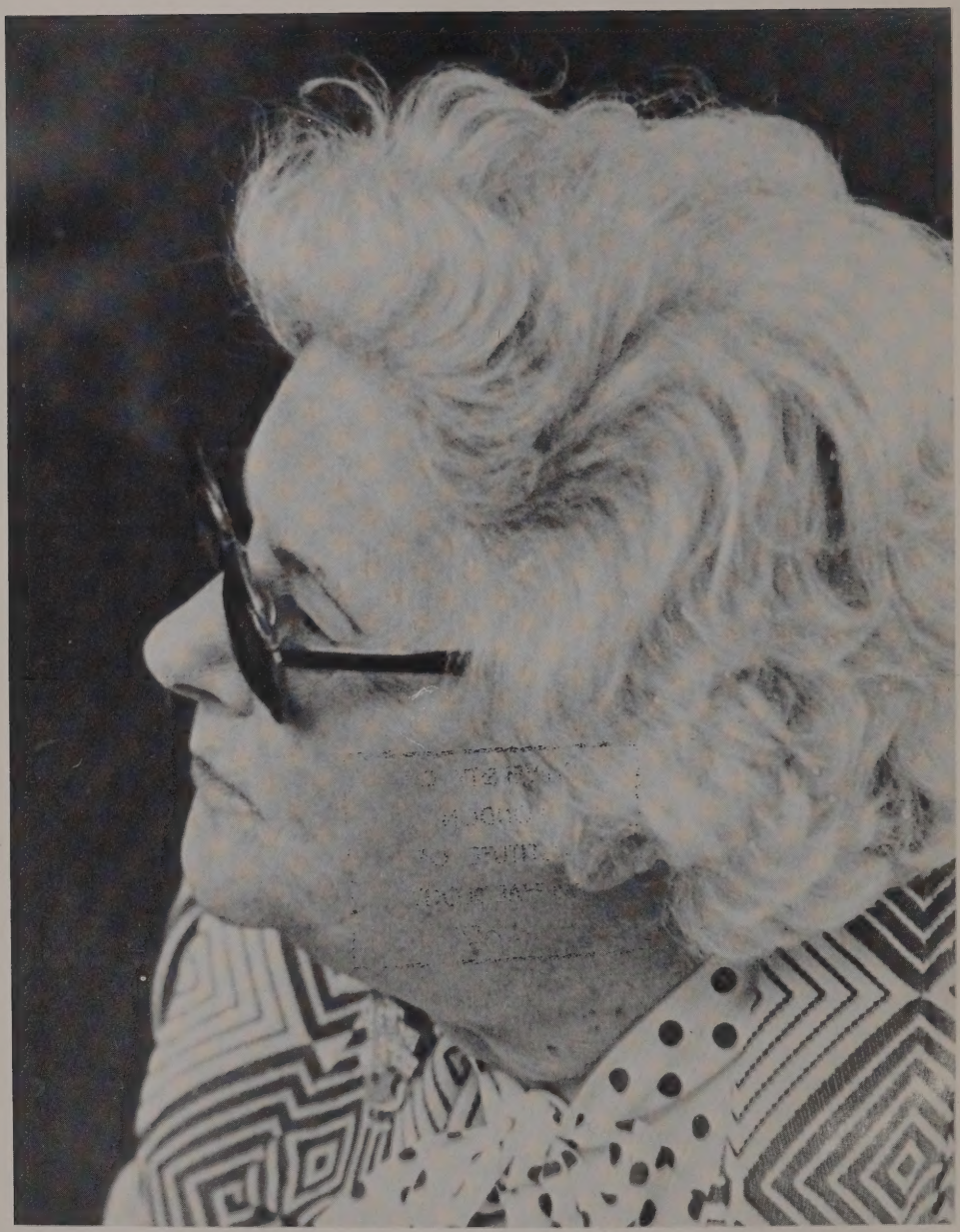

Dr M. Aylwin (Molly) Cotton, OBE, FSA, HonFBA

One of the first students of the Institute of Archaeology: Diploma 1936. Her Foundation to promote Mediterranean studies has already supported much valuable work. For her 80th Year.

26. OCT. 1983

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Breaking Ground: Agricultural Origins and Archaeological Explanations*

by DAVID R. HARRIS

Like George, the professor in Tom Stoppard's play *Jumpers* preparing his public address, an inaugural lecturer has first to decide how to begin.[1] Faced with this dilemma, he has to choose which of two roads to follow. Either he can stand back and take a broad view of his discipline, measure its progress, take its intellectual temperature, and prescribe new methodological treatments to promote its future health, or he can interpret his brief more narrowly and re-visit the academic territory to which he has staked a particular claim. It is my intention to follow this second road, and in so doing to explore the intellectual lineage of the field of study that has long been my concern: the origins and early development of agriculture. That I can afford this measure of self indulgence is largely due to my predecessor in the Chair of Human Environment, Geoffrey Dimbleby. On the occasion of his own inaugural in 1965[2] Professor Dimbleby ably surveyed the field, and charted the future course, of the sub-discipline of environmental archaeology. It is because he did so, and later worked so hard to establish it in the realms of research and teaching – here at the Institute and elsewhere in the country – that I feel free to explore my particular research interest, rather than restate the case for environmental archaeology. As the Science Correspondent of the BBC recently argued in his introductory paperback, *Science and Archaeology*,[3] the battle for the recognition of environmental archaeology – as an education and as a profession – has largely been won, at least in Britain and the United States: a victory that was reinforced in Britain in 1979 by the formation – on the initiative of Geoffrey Dimbleby and Don Brothwell – of the Association for Environmental Archaeology. And even if in practice archaeology still falls short of the integration of arts and science hopefully anticipated by Professor Dimbleby in 1965, there has been a welcome shift within the discipline from 'the study of man and his cultures to the study of man in his environments'.[4]

This shift has been nowhere more apparent than in the escalation of research into the origins of agriculture that has occurred during the last three decades. Philosophical curiosity about the antiquity of agriculture, and about the obscure history of our cultivated plants and domestic animals, has been a recurrent theme in Western thought since Classical

*This paper is a slightly expanded version of Professor Harris's inaugural lecture delivered at the Institute of Archaeology on Tuesday, 5 May 1981, under the chairmanship of Professor J. D. Evans, FBA, Director of the Institute.

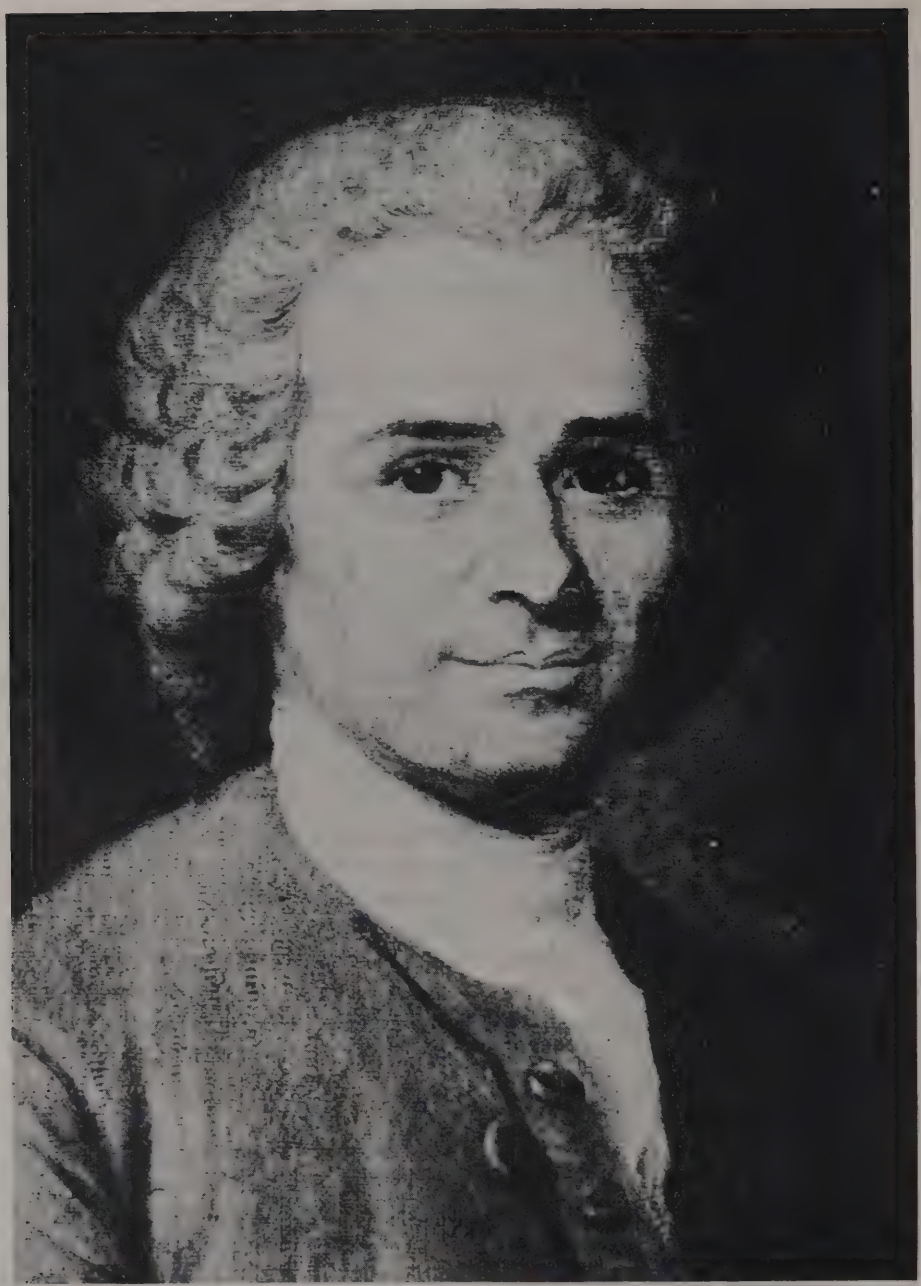

Plate I Jean-Jacques Rousseau, 1712–78. Portrait by Quentin de la Tour, Musée des Arts et d'Histoire, Geneva; said to be the only portrait of which Rousseau himself approved.

times. It has been expressed in many different ways, but running through the historical profusion of ideas are two broadly contrasted points of view. The first and most frequently expressed of these is speculative and generalising, the second cautious and specific: the one offers philosophical 'explanations', usually with little concern for evidence; the other is more aware of the lack of, and need for, factual data. Two intellectual giants of the 18th century – Jean-Jacques Rousseau and Alexander von Humboldt (Plates I and II) – epitomise this contrast, in their comments respectively on agriculture and on plant and animal domestication.

In the *Discours sur l'Origine et les Fondements de l'Inégalité parmi les Hommes*, first published in 1755,[5] Rousseau disposes of the question of the origins of agriculture with characteristic confidence and irony. Following the celebrated passage in which he associates the adoption of agriculture with the disappearance of equality and the growth of slavery and misery, when 'vast forests were changed into smiling fields which had to be watered with the sweat of men', Rousseau continues:

> 'Metallurgy and agriculture were the two arts whose invention produced this great revolution. For the poet it is gold and silver, but for the philosopher it is iron and wheat which have civilized men and ruined the human race. . . . With regard to agriculture, its principle was known long before its practice was established, and it is hardly possible that men, constantly occupied with obtaining their subsistence from trees and plants, did not rather promptly have an idea of the ways used by nature to grow plants. But their industry probably turned in that direction only very late, either because trees, which along with hunting and fishing provided their food, did not have need of their care; or for want of knowing how to use wheat; or for want of implements to cultivate it; or for want of foresight concerning future need; or, finally, for want of means to prevent others from appropriating the fruit of their labor. Once they became industrious, it is credible that, with sharp stones and pointed sticks, they began by cultivating a few vegetables or roots around their huts long before they knew how to prepare wheat and had the implements necessary for large-scale cultivation.'[6]

And, if we ask Rousseau why men 'became industrious', we find an answer earlier in the discourse that has the ring of modern demographic determinism about it:

> 'let us suppose that men had multiplied so greatly that the natural productions no longer sufficed to nourish them: a supposition which, it may be added in passing, would show a great advantage for the human species in that way of life.'[7]

Fifty years later Humboldt, on his return to Europe after his arduous explorations of tropical South America with the French botanist Aimé Bonpland, struck a less confident note in his *Essai sur la Géographie des Plantes*:[8]

> 'The origin, the first homeland, of the plants most useful to man and which have accompanied him from the remotest epochs, is a secret as impenetrable as the first

Plate II Alexander von Humboldt, 1769–1859. Self portrait, 1814 (reproduced, by kind permission of Oxford University Press, from L. Kellner: *Alexander von Humboldt,* Oxford University Press, 1963).

> dwelling place of all domestic animals. We are ignorant of the homeland of the grasses that provide the staple food of the Mongolian and Caucasian races; we do not know what region produced spontaneously the cereals, wheat, barley, oats and rye. The latter may not even have been cultivated by the Romans. It is claimed that barley has been found wild on the banks of the Samara in Tartary, *Triticum spelta* in Armenia, rye in Crete, wheat at Baschiros in Asia; but these facts are not well established, for it is very easy to regard as wild plants those which, scattered far from the world of man, have regained their former liberty. Birds, by eating cereal grains, easily disperse them in the woods. The plants which constitute the natural wealth of all the inhabitants of the tropics, the banana, the papaya, manioc, and maize, have never been found in the wild state. I have seen them in several places on the banks of the Casiquiare and the Rio Negro; but the melancholy and suspicious native of these regions cultivates small plots in the most remote places; he abandons them shortly thereafter, and the plants which remain soon appear natural to the soil which produces them. The potato, that beneficial plant which largely supports the population of the least fertile lands in Europe, presents the same phenomenon as the banana, maize and wheat. In the enquiries I have made into these matters, I have never heard of a single traveller who had found it wild, either on the heights of the Peruvian cordillera or in the kingdom of New Granada, where this plant is cultivated with *Chenopodium quinoa.*'[9]

Humboldt's secret was to remain impenetrable through most of the 19th century, although this did not prevent continued speculation about the origins of cultivated plants and domestic animals. Charles Darwin was interested in domestication mainly for what it could tell him about the changes induced by artificial selection, but he did speculate about the beginnings of agriculture in *The Variation of Animals and Plants under Domestication,* first published in 1868:

> 'The savage inhabitants of each land, having found out by many and hard trials what plants were useful, or could be rendered useful by various cooking processes, would after a time take the first step in cultivation by planting them near their usual abodes. . . . The next step in cultivation, and this would require but little forethought, would be to sow the seeds of useful plants; and as the soil near the hovels of the natives would often be in some degree manured, improved varieties would sooner or later arise. Or a wild and unusually good variety of a native plant might attract the attention of some wise old savage; and he would transplant it, or sow its seed.'[10]

It was not, in fact, until late in the 19th century that the first systematic history of domesticated plants or animals appeared. In 1882 Alphonse de Candolle, son of a famous botanical father,[11] published his *Origine des Plantes cultivées*, a study that is still remarkable for its comprehensiveness and for its use of archaeological, historical, and linguistic, as well as botanical, evidence.[12]

Philosophical speculation about the origins of agriculture continued to outweigh the search for factual evidence until well into the 20th century.[13] Most of it took the form of variations on the ancient theme of the so-called 'three stages of man': the notion that mankind had progressed from hunting through herding to agriculture.[14] This concept, which can be traced back in print to the 1st century BC in Varro's work *Rerum Rusticarum*,[15] and before that to the ideas of the philosopher Dicaearchus, who was a student of Aristotle,[16] continued to influence assumptions about the economic history of mankind until the late 19th century, despite the fact that its universality was earlier challenged by Humboldt,[17] and before him by Henry Home (Lord Kames),[18] chiefly on the grounds that, among the American Indians, there was no evidence of a herding or pastoral stage between hunting and agriculture.

In the middle of the 19th century the three-stage theory (*Dreistufentheorie*) was adopted and elaborated by German political economists, by which route it came to be incorporated into the historical analyses of Friedrich Engels and Karl Marx, and its influence persisted until recently in the work of Soviet archaeologists and ethnographers.[19] But through the 19th century it suffered progressive erosion, as ethnographic descriptions of non-European peoples confronted it with more and more exceptions that could not be reconciled with its simplified categories and unidirectional character. Eventually it was abandoned as a comprehensive theory, although it continued to condition debates about the origins of agriculture, for example in the reviews of the first volume of the prehistorian Gabriel de Mortillet's book, *Origines de la Chasse, de la Pêche et de l'Agriculture*, which was published in 1890.[20]

These debates soon took a new turn: theorising about the temporal order in which hunting, pastoralism, and agriculture emerged began to give way to refinements of the concept of agriculture itself. Ethnographic descriptions and collections, especially of tillage tools, became sufficiently abundant to reveal regularities in their distribution: thus it came to be realised that, prior to the expansion of Europeans overseas in the 16th century, the plough was restricted to a continuous area that enclosed the civilisations of Asia, Europe, and northern Africa. Elsewhere, wherever agriculture was practised, in tropical Africa, the Americas, and the Pacific, fields were tilled by hoe, digging stick, or pull-spade. The German geographers Friedrich Ratzel and Eduard Hahn (Plate III) introduced into the literature a distinction between agriculture (*Ackerbau*) and hoe culture (*Hackbau*).[21] This implied not only a fundamental difference in techniques of tillage, but in other attributes too. As elaborated by Hahn in several publications that appeared between 1891 and 1926,[22] hoe culture was associated with the hand cultivation of small fields or plots, the work being done by women; with the mixed planting of different crops in the same plot; with an emphasis on roots and tubers, although not to the exclusion of grains; and with the abandonment of plots when their fertility was exhausted. Agriculture, on the other hand, involved the cultivation of larger fields by means of animal-drawn ploughs and the repeated use of the same fields, the fertility of which was renewed by manuring and fallowing. Hoe culture and agriculture were not regarded as mutually exclusive categories, but the former was envisaged as predating, and giving rise to, the

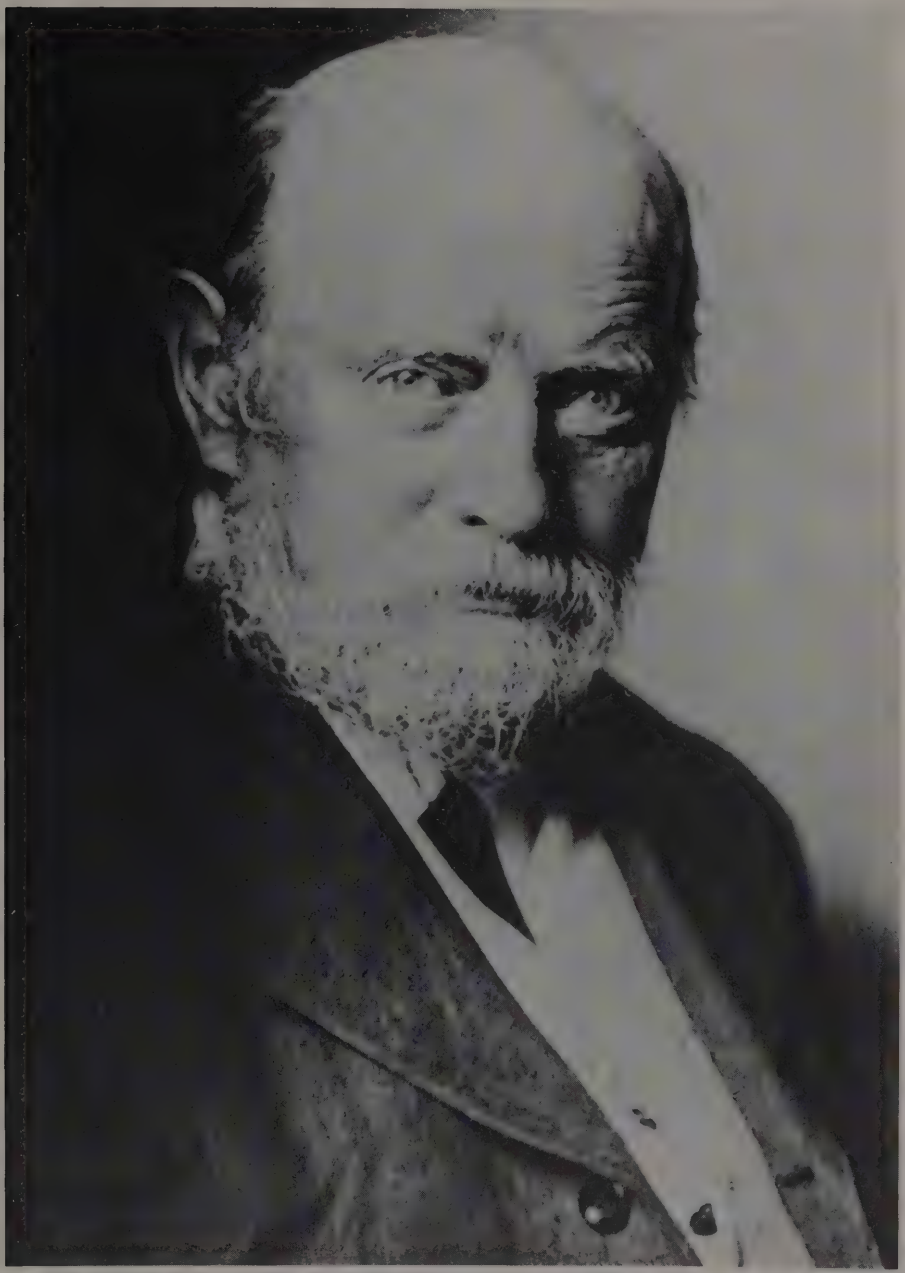

Plate III Eduard Hahn, 1856–1928 (reproduced by kind permission of the Wenner-Gren Foundation for Anthropological Research, New York).

latter. Thus Hahn postulated that wheat and barley were first cultivated in small hand-hoed fields in Mesopotamia, long before cattle were domesticated and the plough developed as an implement of tillage. He refuted the idea – integral to the three-stage theory – that animal domestication and pastoralism preceded agriculture, but he did not reject the concept of developmental stages as such, hoe culture being regarded as ancestral to agriculture. Despite his originality Hahn remained a prisoner of the cultural-evolutionary *Zeitgeist* of the late-19th century, but his work is remarkable in that it foreshadows many of the questions that concern us today, for example the relative importance in early agricultural systems of male and female labour, of grains and root crops, of mixed cropping and monocropping, and of permanent fields and shifting fields (i.e. swidden cultivation), as well as the archaeologically rather more amenable question of the types of tillage implements used.

As a student of agricultural origins, Hahn was both of, and ahead of, his time. He felt that his novel ideas were unjustly dismissed by his colleagues, not always on purely academic grounds. His proposition that cattle were domesticated for ritual rather than for economic reasons, in the context of early Near Eastern fertility cults, was sufficiently outrageous to ensure that it was ignored for over 50 years, and shocked silence seems to have greeted his thesis that the plough originated as a ceremonial phallic symbol for inseminating the female earth.[23] But, by the time of his death in 1928, Hahn's less controversial ideas about the typology and development of early agriculture had been widely accepted by European ethnologists, and archaeologists had begun to draw conclusions about prehistoric tillage on the basis of their finds of artefacts resembling hoe blades and plough shares.[24]

Despite the interest of Ratzel, Hahn, and other late-19th century scholars in the putative stages of mankind's economic development, they paid little attention to the question of how the transitions from one stage to another actually took place. It is true that Ratzel had already, in 1885, suggested that there was a necessary relationship between settled life and animal domestication,[25] and that Hahn reinforced and refined this view in his discussions of how cattle were domesticated by sedentary Near Eastern farming communities.[26] But until the rigidities of the concept of developmental stages had further dissolved early this century, little interest was shown in the *processes* whereby agriculture arose. That is the area of enquiry that has increasingly concerned those who followed in the footsteps of the 19th-century pioneers. And so the story moves closer to home, and indeed to this Institute, because, of course, foremost among those successors was V. Gordon Childe, its first full-time director (Plate IV).[27]

There is neither need nor space here to develop a critique of Childe's celebrated concept of the Neolithic Revolution. It is sufficient to note that he envisaged the domestication of plants and animals as taking place in the ancient Near East during a climatic shift toward greater aridity ('desiccation'), following the retreat of the ice sheets of the last glacial period. Lack of water, he argued, forced people to concentrate in the river valleys and around oases where close contact with the plants and animals that they already gathered and hunted resulted in domestication and the establishment of a food-

Plate IV V. Gordon Childe, 1892–1957. Photograph, 1947, on a visit to Ankara (by courtesy of the Institute of Archaeology, London).

producing economy. This 'oasis' or 'propinquity' theory, based as it was on the idea of climatic change as a primary cause of the Neolithic Revolution, crystallised for a generation ideas about the origins of agriculture, despite the fact that Childe suggested only the general context in which agriculture arose and failed to specify at all precisely the processes involved in domestication and the transition to a settled, farming way of life. As a Marxist, Childe inherited much of the intellectual superstructure of 19th-century cultural materialism, including the concept of evolutionary stages (although he preferred Lewis Henry Morgan's three-tier social hierarchy of savagery, barbarism, and civilisation to the more strictly economic terms of the classical three-stage theory).[28] This intellectual background is reflected in the many highly readable and widely read books and papers that he published between 1935 and his death in 1957, particularly in his two mischievously titled best sellers: *Man Makes Himself* and *What Happened in History*.[29] The evolutionary and diffusionist model that Childe developed in these publications rested firmly on his conviction that the Near East was the primary Neolithic hearth from which agriculture, and later technical innovations such as bronze and iron making, radiated outward to Europe and other parts of the Old World. It had the elegance of simplicity, and, with the advent of radiocarbon dating in the 1950s, its relative chronology soon appeared to be confirmed by a large number of absolute dates, as was deftly demonstrated by Grahame Clark in 1965.[30]

Although Childe's model of the Neolithic Revolution constituted a more complete 'explanation' of the origin of agriculture than earlier ones, he was, like most of his predecessors, more interested in formulating an hypothesis than in seeking data with which to test it. It was left to Robert Braidwood and his colleagues working from the Oriental Institute in Chicago after the Second World War to undertake the first project that was to grapple with the Neolithic Revolution in the field, at the now famous Iraqi site of Jarmo. In an entertainingly retrospective article that appeared this year in *Antiquity*, Braidwood makes clear that the Jarmo project was first conceived as an attempt to fill the chronological gap that then existed between the latest Pleistocene and the earliest village sites in the Near East, but he also acknowledges the strength of Childe's influence on his thinking.[31] Field work at Jarmo and elsewhere in the Zagros region of Iraq (and later Iran) continued through the 1950s, and the roll-call of those associated in different capacities with this work is virtually a who's who of early post-war archaeological work on the origins of agriculture in the Near East: Kent Flannery, Jack Harlan, Hans Helbaek, Frank Hole, Bruce Howe, Charles Reed, Herbert Wright, William van Zeist.[32] There was even a link between London and Chicago at this time because two of the samples collected during the first season at Jarmo for age determination by the then brand-new technique of radiocarbon assay were dated by Frederick Zeuner, who in January 1946 had been appointed first Professor of Environmental Archaeology here at the Institute (Plate V).[33]

It is not my intention to chart in detail the more recent course of what by 1973 Flannery could look back on as the bandwaggon of agricultural-origins research that rolled with gathering momentum through the 1950s and 1960s.[34] Instead, it is perhaps appropriate in an inaugural lecture to indulge briefly in a more personal account of how I

Plate V Frederick E. Zeuner, 1905–63. Photograph, 1956, at the Institute of Archaeology, University of London (by courtesy of the Institute of Archaeology).

came to ride that waggon: a ride that can be said to have begun in the late 1950s on the Berkeley campus of the University of California. On arriving there direct from Oxford, in a state of profound ignorance about what might lie at the end of that academic rainbow, I had my first and most forceful experience of serendipity. Berkeley was indeed for me 'a happy and unexpected discovery made by accident'. Carl Sauer had just completed 31 years as Chairman of the Geography Department, although he was to continue to work there for a further 20 years until his death in 1975 (Plate VI). The extraordinary depth and breadth of his scholarship, nourished by a lifetime of field work, mainly south of the Rio Grande, opened for me new and enticing prospects of other lands and distant times. Having arrived imbued with youthful fervour to change the world for the better, by, as I then thought, working on large-scale agricultural development schemes, I learned over the next few years to read the ecological history of man's use and abuse of the habitable earth in a new way. During my second year at Berkeley that massive and prescient symposium volume *Man's Role in Changing the Face of the Earth* (to which Professor Dimbleby called attention in his inaugural lecture) was published.[35] Twenty-five years later the 'Berkeley Bible', as we soon came irreverently to call it, remains the most comprehensive and authoritative examination of man's ecological domination of the earth. Sauer's Bowman Memorial Lectures on 'Agricultural Origins and Dispersals', given in New York early in 1952, had also recently been published,[36] and I remember becoming utterly absorbed in that slim volume at first reading. Although later study and reflection has led me to reject many of the fundamental assumptions on which his synthesis rests – particularly the presumed absence of stress in the emergence of agriculture, and the dominance of diffusion in its development – it was reading that book, and listening to Sauer expound the theme more fully in his lectures, that set me on the academic road I have since travelled. And the fact that I was able to travel that road unimpeded – and often abroad – is due both to the long-suffering tolerance of my wife and family, and the intellectual freedom accorded to a wayward geographer by the two heads of department under whom I served at University College London: Professor H. C. Darby and Professor W. R. Mead.

It was not until I had distanced myself for some years from the formative influences of Berkeley – influences incidentally that for me included such figures as Herbert Baker and H. L. Mason in Botany and Wolfram Eberhardt and George Foster in Anthropology – that Sauer's place in the intellectual traditions of European and North American scholarship began to come into focus. Like Gordon Childe, Sauer was strongly influenced by the Germanic anthropological tradition that opposed independent invention to diffusion as alternative explanations of cultural change. But although they were both diffusionists, Sauer, unlike Childe, emphatically rejected the concept of stages of cultural development. He distrusted attempts to formulate abstract theories to explain human behaviour, and rooted his own admittedly imaginative reconstructions of the past firmly in what he regarded as the realities of place and time. The ecological understanding that permeates his work – and that led to his being adopted in the last years of his life as a prophet of the new ecological movement – grew out of his acute observations over many years of the interactions of plants, animals, and people in the landscape, particularly in the back

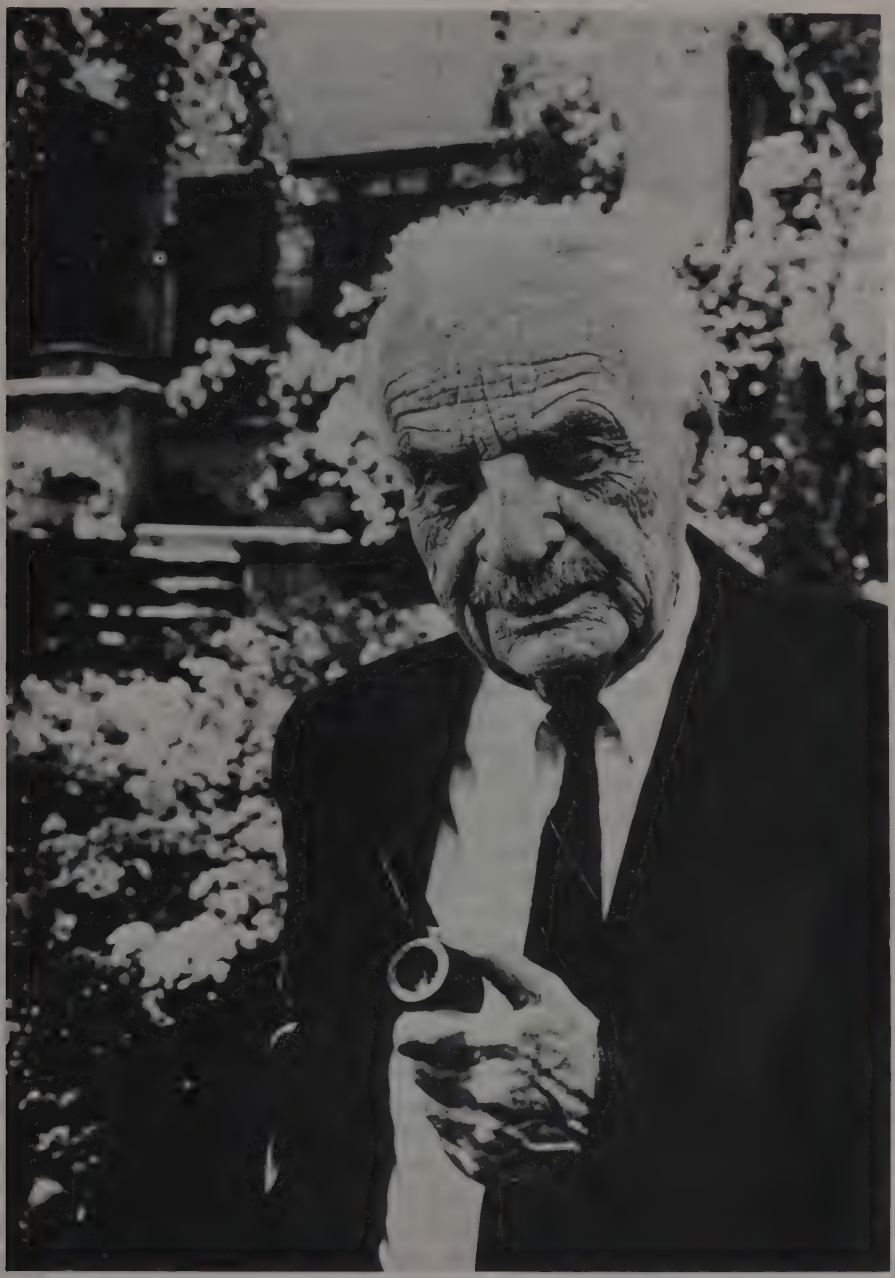

Plate VI Carl O. Sauer, 1889–1975. Photograph, 1973, in the garden of his home in Berkeley, California (by courtesy of the Department of Geography, University of California, Berkeley).

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country of rural Mexico that he came to know so well. And it was perhaps the very richness of his field experience that led him to reject the more formal constructs of ecologists, especially those expressed quantitatively or in the language of systems analysis.

By the mid 1960s the early optimism that the origins of agriculture lay within the archaeologist's grasp, at least in the Near East, and, following Richard MacNeish's pioneering investigations in the Tehuacan Valley,[37] also in Mexico, had begun to fade. The acquisition of more and more evidence – in the form mainly of the bones of now-domesticated animals and the charred remains of now-cultivated plants – complicated rather than clarified the emerging picture. The naive assumption that such remains, when properly identified and dated, were reliable indicators of an agricultural economy having been practised at a site, was increasingly questioned, notably by Eric Higgs and his associates at Cambridge, who, under the auspices of the British Academy Major Research Project in the Early History of Agriculture, succeeded in setting the subject in the much wider and more realistic context of the study of prehistoric economies as such.[38] They sought to undermine the long-established conceptual dichotomy between agriculture and hunting and gathering, and, by interpreting archaeological data in terms of biological and economic principles and ethnographic analogies, tried to understand how prehistoric economies actually functioned.

The rejection of the dichotomy between hunter-gatherer and farmer in favour of a more holistic view of prehistoric subsistence was also implicit in the work being done in the late 1960s by Lewis Binford[39] and Kent Flannery,[40] both of whom developed new explanatory insights into the complexities of subsistence behaviour by the application to their data of concepts derived from systems theory. At the same time, I was seeking, in my ecological approach to the study of early agriculture in the tropics, to establish a distinction between the *manipulation* of plant and animal resources, which often involved intervention in the breeding system of a wild organism to the extent that genetic selection and morphological change, or 'domestication', resulted, and the *transformation* of predominantly natural into predominantly artificial ecosystems, which was characteristic of fully developed agricultural economies.[41] I argued that this distinction also represented a temporal progression and that fully agricultural economies had tended to become established relatively late in prehistoric times. Manipulation and transformation were thus seen as two phases in a gradient of ecological change induced by human modification of natural ecosystems. This concept readily accommodated the awkward 'in-between' states of so-called semi-domesticated plants and animals that had so complicated and confused the search for the 'earliest agriculture'. It also downgraded the overdrawn dichotomy between hunter-gatherer and farmer, and focused attention on the whole range of resources that were exploited rather than on the essentially definitional question of whether a particular prehistoric economy was 'agricultural' or not.

Thus by the early 1970s the ideas of many of us who had been pursuing the elusive goal of agricultural origins independently, and in different parts of the world, were converging on a redefinition of objectives. Whether the new aim was expressed as the study of *economies* (the Higgs school) or of *systems* (Binford, Flannery, and myself) was

less significant than the fact that agriculture was now being viewed not in isolation but in the wider context of the overall use of organic resources.[42] Greater emphasis was also being given, in the framing of explanatory models, to the social contexts in which agriculture emerged, a trend that has recently been accentuated.[43]

In retrospect then, we can see that the study of agricultural origins over the last hundred years has followed a course familiar to students of the history of science. In the late-19th and early-20th centuries curiosity about the beginnings of agriculture was largely satisfied by highly generalised, deductive 'explanations' derived from the old idea of cultural evolution through successive stages. This long conceptual phase gave way in the 1950s to the search for empirical evidence from archaeological sites, evidence which in its turn demanded the formulation of new and more complex explanatory models. We have now, I suggest, reached the point, when, faced with a plethora of new models, the most urgent need is for more evidence with which to test and in due course modify those models. The task is doubly difficult, because the models we seek to test are so complex, and the evidence we can obtain with new techniques is so rich. But the potential reward is a much more precise understanding than we have at present of how agriculture emerged and of the socioeconomic and ecological changes that accompanied that transformation. If we are to succeed in this task it is, I believe, imperative to devise research strategies that are capable of answering specific questions with reference to particular sets of data; in other words to try to close the gap that still separates so much high-level, general theorising from on- (or in-) the-ground evidence, i.e. to generate what Binford refers to as 'middle-range theory'.[44] The challenge is to steer a middle way between devising intellectually satisfying but inherently untestable abstract models, and taking refuge in the naive belief that the evidence 'speaks for itself' and that all we have to do is to dig it up and analyse it.

There are many ways of occupying this middle ground, two of which I wish briefly to illustrate. The first reverses the usual approach to archaeological interpretation by reconstructing past subsistence patterns by inference from ethnographic, historical, and ecological data, and then testing the reconstructions by reference to local archaeological and palaeoenvironmental evidence. This is the research strategy that I have employed in the Torres Strait region between Australia and Papua New Guinea which I first selected, in 1974, as an area in which to experiment with a new approach to the study of agricultural origins. My intention was to investigate the 'non-adoption' of agriculture at what had traditionally been regarded as a well-defined boundary between the horticulturalists of New Guinea and the hunter-gatherers of Australia. The ethnographic reality proved to be much more complex, and I soon found myself studying a spectrum of pre-European subsistence systems with a highly variable agricultural component. The research strategy is, however, well suited to such a region, which has only recently been affected by European contact, is well documented historically, and is archaeological *terra incognita.* Having completed the preliminary ethnoecological reconstruction, we are now embarking on the second and more difficult phase which depends for its success on obtaining archaeological and palaeoenvironmental evidence that is sufficiently detailed to test the inferred patterns of pre-European settlement and resource use.[45] If successful, the project

can be expected to yield insights into the conditions that have favoured or discouraged the adoption, and intensification, of agriculture, not only in Torres Strait but also in other regions and at other times in the past.

The second research strategy that I wish to mention works in a more orthodox way, from the archaeological evidence to its interpretation, but it does so at a level calculated to provide answers to precisely formulated questions that themselves relate back to processes hypothesised in more general explanatory models. A project that illustrates this approach is one that we are undertaking in the Department of Human Environment here at the Institute.[46] It involves the analysis of charred plant remains from Near Eastern sites, chiefly the extraordinarily large and diverse assemblage recovered from the Epipalaeolithic–Neolithic site of Abu Hureyra in northern Syria, which was located at the local ecotone between steppe and riverine forest.[47] Our aim in this investigation is to answer four interrelated questions that are fundamental to the understanding of agricultural origins in the Near East: (i) for how long were morphologically wild forms of cereals and pulses cultivated prior to the emergence of fully domesticated crops?; (ii) for how long did the exploitation of wild plants for food continue to play a major economic role during the early development of agriculture?; (iii) were the early phases of cultivation associated with sedentism (i.e. the year-round occupation of sites)?; and (iv) when was the technique of irrigation applied to the cultivation of cereals and pulses? With the application of new techniques, particularly scanning-electron microscopy, to the analysis of plant remains, combined with phyto-ecological field work and the use of ethnographic data, we hope to answer these basic questions, in a local context at least, and thus to get closer to understanding some of the actual processes involved in the transition to agriculture.

And so, after more than a century of speculation and investigation, a comprehensive explanation of the origins of agriculture continues to elude us. There is still need and scope for breaking new ground, in the field as well as in the mind. Nor is the challenge only of academic interest. In a world where almost the entire human population of some 4,000 million depends for its food supply on the products of agriculture, and where our ability to reduce malnutrition and the threat of mass starvation is in doubt, study of primitive systems of agriculture, and of the former uses of wild plants and animals for food, has increasing relevance. It has long been recognised that research into the ancestry of our crops and domestic animals is of direct value to modern plant and animal breeders, whose efforts to develop higher yielding or more disease-resistant forms increasingly depend on access to the genetic diversity that exists in the ever-diminishing populations of related wild, weedy, and primitive domestic varieties. Indeed, concerted efforts are now being made internationally to conserve, before it is too late, such plant-genetic diversity as still exists: efforts to which Professor J. G. Hawkes, who has also contributed much to the study of agricultural origins, has made an outstanding contribution.[48] Another and more recent trend in the application to present-day problems of research on early agriculture is the direct involvement of some archaeologists in schemes to improve agricultural production in the areas where they have worked. A striking example of this trend

is Matthew Spriggs' energetic efforts to work with the local people of the island of Aneityum in Vanuatu (formerly the New Hebrides) to bring back into use the remarkably extensive prehistoric irrigation system that his research has revealed there.[49]

But ultimately the attempt to understand the origins and early development of agriculture needs no special justification. It remains one of the pivotal problems in the human past, equivalent in magnitude and interest to the emergence of man or the formation of urban civilisation (to which latter it is of course closely related). To follow its ramifications is necessarily to be led into the study of the interrelations of society, economy, and the environment, into, in other words, the study of human ecology. By its very nature it bridges the artificial divide that Western traditions of scholarship have created between the arts and the sciences, and I like to think therefore that it is a particularly fitting subject to study in a Department of Human Environment established within an Institute of Archaeology.

Sixteen years ago this month, Geoffrey Dimbleby, in his own inaugural, described the subject of his concern as 'the ecology of man in the past'. That remains the most apt description of the theme that unites those of us who work in the Department of Human Environment. If I have focused on just one aspect of that theme, it is not because I regard the study of early agriculture as of paramount importance. Our subject is not limited by topic, place, or time. It is as wide as the great globe itself and as deep as human history. Thomas Henry Huxley got it right over a century ago:[50] what we seek to comprehend is man's place in nature.

Notes and References

[1] George is not an inspiring example to follow, for, as he says, 'experience has taught me that to attempt to sustain the attention . . . of academics by argument alone is tantamount to constructing a Gothic arch out of junket'. Tom Stoppard, *Jumpers,* Faber and Faber, London, 1972, p. 27.

[2] Dimbleby, G. W. 1965. Environmental studies and archaeology, *Bull Inst Archaeol Univ London,* **14**: 1–12.

[3] Wilson, David, 1978. *Science and Archaeology,* Penguin Books, Harmondsworth.

[4] Wilson, David, *op. cit.*, p. 281.

[5] Rousseau, Jean Jacques, 1755. *Discours sur l'Origine et les Fondements de l'Inegalité parmi les Hommes,* Marc Michel Rey, Amsterdam. The passages quoted occur on pp. 118–22 and 41 of this original edition.

[6] The English translation quoted here is by R. D. and J. R. Masters in *Jean-Jacques Rousseau. The First and Second Discourses* (ed. R. D. Masters), St. Martin's Press, New York, 1964, pp. 151–3.

[7] Masters, R. D., *op. cit.*, p. 118.

[8] Humboldt, Alexander von, 1807. *Essai sur la Géographie des Plantes,* a facsimile published by the Society for the Bibliography of Natural History, London, 1959. The title page of the original is dated 1805 because the 'Essai' was the text of a lecture given at the Institut de France in Paris on 7 January 1805. It was, however, not printed before 1806 and probably not published before 1807.

[9] Humboldt, Alexander von, *op. cit.*, 1807, pp. 28–9 (my translation).

[10] Darwin, Charles, 1868. *The Variation of Animals and Plants under Domestication,* 2 vols., John Murray, London, Vol. I, pp. 309–10. In this passage Darwin hints at the so-called 'dump-heap' theory of the origin of agriculture that Edgar Anderson sketched nearly a century later in *Plants, Man and Life,* Little, Brown, Boston, 1952, pp. 149–50.

[11] Augustin de Candolle (1778–1841) a Genevese who was for eight years Professor of Botany at Montpellier and later Professor of Natural History and Director of the Botanic Garden in Geneva: A. Davy de Virville, *Histoire de la Botanique en France,* Société d'Edition d'Enseignement Supérieur, Paris, 1954, pp. 184–5 and 245.

[12] Candolle, Alphonse de, 1882. *Origine des Plantes cultivées,* Germer Baillière, Paris; although the title page is dated 1883 the book was in fact published in October 1882. An English translation was published in 1884 as *Origin of Cultivated Plants,* Kegan Paul, Trench, London. De Candolle first discussed the question of the origin of cultivated plants in his earlier work *Géographie botanique raisonnée ou Exposition des Faits principaux et des Lois concernant la Distribution géographique des Plantes de l'Epoque actuelle,* Victor Masson, Paris, 1855, pp. 809–993.

[13] An exception to this generalisation is Victor Hehn's historical and linguistic study of the origins and dispersal of (mainly Mediterranean) cultivated plants and domestic animals: *Kulturpflanzen und Hausthiere übergang aus Asien nach Griechenland und Italien sowie in das übrige Europa,* Gebrüder Brontraeger, Berlin, 1870, which appeared in an English translation by J. S. Stallybrass (dedicated to William Gladstone) in 1885: *The Wanderings of Plants and Animals from their First Home,* Swan Sonnenschein, London. Another interesting exception is a paper read to the Royal Anthropological Institute of Great Britain and Ireland in 1886 in which H. Ling Roth sets out what he regards as the preconditions necessary for agriculture to arise (security, capital, labour, freedom from pests, fixed settlement, and want of food) and then discusses the latter three in terms of ethnographic examples drawn from all over the world: On the origin of agriculture, *J R Anthrop Inst,* 1887, **16**: 102–36.

[14] In this section I have followed Fritz L. Kramer's detailed discussion of the lineage of the three-stage concept, and its influence on later-19th century anthropologists and geographers: Eduard Hahn and the end of the 'Three stages of man', *Geographical Review,* 1967, **57**: 73–89. This concept should not be confused with the three-age system of archaeological classification (into Stone, Bronze, and Iron Ages) that was first formalised and published by the Danish scholar C. J. Thomsen in 1836; for recent discussion of the development of the three-age system see the contributions by Bo Gräslund, Judith Rodden, and Kurt Böhner to *Towards a History of Archaeology* (ed. Glyn Daniel), Thames and Hudson, London, 1981.

[15] The *Rerum Rusticarum* was published in 37 BC. See the English translation by Lloyd Storr-Best: *Varro on Farming. M. Terenti Varronis Rerum Rusticarum Libri Tres,* G. Bell, London, 1912, pp. 127–9.

[16] The intellectual link between Varro and Dicaearchus is discussed by Clarence J. Glacken in *Traces on the Rhodian Shore. Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century,* University of California Press, Berkeley, 1967, pp. 140–1, as well as by Fritz L. Kramer, *op. cit.,* pp. 73–4.

[17] Humboldt, Alexander von, 1847. *Kosmos. Entwurf einer physischen Weltbeschreibung,* 5 vols., J. G. Cotta'scher, Stuttgart and Tübingen, Vol. II, pp. 488–9, note 15.

[18] Home, Henry (Lord Kames), 1774. *Sketches of the History of Man,* 2 vols., W. Creech, Edinburgh, Vol. II, pp. 82–4.

[19] Kramer, Fritz L., *op. cit.,* p. 79; Klejn, Leo S., A panorama of theoretical archaeology, *Curr Anthrop,* 1977, **18**: 1–42, reference on pp. 12–16.

[20] Mortillet, Gabriel de, 1890. *Origines de la Chasse, de la Pêche et de l'Agriculture,* Vol. I, *Chasse, Pêche, Domestication,* Lecrosnier et Babé, Paris; reviewed by J. Mestorf in *Das Ausland,* 1891, **64**: 54–9 and 71–5.

[21] The terms *Ackerbau* and *Hackbau* were first used by Ratzel and by Hahn in 1891: Friedrich Ratzel, *Anthropogeographie,* 2 vols., J. Englehorn, Stuttgart, Vol. II, *Die geographische Verbreitung des Menschen,* p. 741; Eduard Hahn, Waren die Menschen der Urzeit zwischen der Jägerstufe und der Stufe des Ackerbaus Nomaden?, *Das Ausland,* **64**: 481–7. See also Robert H. Lowie's review of Hahn's and Ratzel's work in his *The History of Ethnological Theory,* Holt, Rinehart and Winston, New York, 1937, pp. 112–27.

[22] See especially the following works by Hahn: *Die Haustiere und ihre Beziehungen zur Wirtschaft des Menschen,* Duncker and Humblot, Leipzig, 1896, pp. 388–96 and 410–23; *Die Entstehung der Pflugkultur* (*unsres Ackerbaus*), Carl Winter, Heidelberg, 1909; *Von der Hacke zum Pflug,* Quelle and Meyer, Leipzig, 1914; and Hackbau, in *Reallexicon der Vorgeschichte* (ed. Max Ebert), 15 vols., Walter de Gruyter, Berlin, Vol. V, 1926, pp. 12–13.

[23] Hahn, Eduard, *op. cit.*, 1896, pp. 75–120; 1909; 1914. Hahn's ideas on the domestication of cattle and the origins of plough agriculture were revived and made widely known in English by Carl Sauer in 1952 in his *Agricultural Origins and Dispersals*, American Geographical Society, New York, pp. 88–9 and 93–4, and by Erich Isaac in 1962: On the domestication of cattle, *Science*, **137**: 195–202. These ideas gained greater credibility following James Mellaart's discovery of evidence of a cattle cult at the Neolithic site of Çatal Hüyük – summarised in his *Çatal Hüyük. A Neolithic Town in Anatolia*, Thames and Hudson, London, 1967, pp. 77–130 – and in 1969 Charles Reed acknowledged (p. 373) that this evidence had made him readier to entertain the possibility of a ritual context for cattle domestication: The pattern of animal domestication in the prehistoric Near East, in *The Domestication and Exploitation of Plants and Animals*, (ed. Peter J. Ucko and G. W. Dimbleby), Duckworth, London, pp. 361–80.

[24] For example Oswald Menghin, *Weltgeschichte der Steinzeit*, Schroll, Vienna, pp. 213, 373 and 392.

[25] Ratzel, Friedrich, 1885. *Völkerkunde*, 3 vols., Bibliographische Institut, Leipzig, Vol. I, p. 57.

[26] Hahn, Eduard, *op. cit.*, 1896, pp. 75–120; 1909; 1914.

[27] Vere Gordon Childe took up office as the first full-time Director of the Institute in September 1946; see *Fourth Annual Report 1947*, Institute of Archaeology, University of London, 1948, p. 7.

[28] Morgan, Lewis H. 1877. *Ancient Society or Researches in the Lines of Human Progress from Savagery through Barbarism to Civilization*, Charles H. Kerr, Chicago, pp. 9–12.

[29] Childe, Gordon, 1936. *Man Makes Himself*, Watts, London; 1942. *What Happened in History*, Penguin Books, Harmondsworth.

[30] Clark, J. G. D. 1965. Radiocarbon dating and the expansion of farming culture from the Near East over Europe, *Proc Prehist Soc*, **31**: 58–73.

[31] Braidwood, Robert J. 1981. Archaeological retrospect 2, *Antiquity*, **55**: 19–26. On p. 20 of this article Braidwood describes his first and last meetings with Childe, in 1935 and 1955, and remarks on 'how much Gordon Childe affected my thinking and . . . how indebted I am to him'.

[32] In the 1950s Kathleen Kenyon, who was then Lecturer in Palestinian Archaeology at the Institute of Archaeology in London, also made a pioneering contribution to the study of early agriculture in the Near East, at the site of Jericho; see her summary article: Jericho and the origins of agriculture, *Advancement of Science*, 1960, **66**: 118–20.

[33] *Third Annual Report 1946*, Institute of Archaeology, University of London, 1947, p. 13. Prior to his appointment as Professor of Environmental Archaeology, Zeuner was Honorary Lecturer in Geochronology at the Institute where he founded what has since become the Department of Human Environment. Shortly before his death in November 1963 he published what is still the most comprehensive and detailed study of animal domestication: *A History of Domesticated Animals*, Hutchinson, London, 1963.

[34] Flannery, Kent V. 1973. The origins of agriculture, *Annual Review of Anthropology*, 2: 271–310.

[35] Thomas, William L., Jr. (ed.) 1956. *Man's Role in Changing the Face of the Earth*, University of Chicago Press, Chicago.

[36] Sauer, Carl O. 1952. *Agricultural Origins and Dispersals*, American Geographical Society, New York; re-issued, with three supplements, as *Agricultural Origins and Dispersals. The Domestication of Animals and Foodstuffs*, MIT Press, Cambridge, Massachusetts, 1969. It is worth recalling, 30 years later, that in this provocative essay Sauer did not 'try to give a well-polished abstract of accepted learning, as much as a prospectus of that which is not securely within our grasp': Sauer, Carl O., *op. cit.*, 1952, p. iii.

[37] The Tehuacan Archaeological–Botanical Project, which sought specifically to investigate the beginnings of agriculture in the New World, was directed by MacNeish and included four field seasons of survey and excavation in the Tehuacan Valley from 1961 to 1964. It culminated in the publication of *The Prehistory of the Tehuacan Valley*, 5 vols., University of Texas Press, Austin and London, 1967–72; most of the evidence for early uses of animals and plants is presented in the first volume: *Environment and Subsistence* (ed. Douglas S. Byers), 1967.

[38] Through the originality of his ideas and the strength of his personality, Eric Higgs exerted a profound influence on a generation of Cambridge students, many of whom became professional archaeologists. The Early History of Agriculture project focused mainly on Europe and the Near East, but the ideas and techniques that Higgs and his colleagues developed – particularly the technique of 'site-catchment analysis' – have diffused far more widely. Much of the work of the 'Higgs school' is summarised in three books published by Cambridge University Press, the last one of

which appeared after Higgs' death in 1976: *Papers in Economic Prehistory* (ed. E. S. Higgs), 1972; *Palaeoeconomy* (ed. E. S. Higgs), 1974; and *Early European Agriculture: its Foundations and Development* (ed. M. R. Jarman, G. N. Bailey and H. N. Jarman), 1982.

[39] Particularly in his seminal paper: Post-Pleistocene adaptations, in *New Perspectives in Archeology*, (ed. Sally R. Binford and Lewis R. Binford), Aldine, Chicago, 1968, pp. 313–41.

[40] Flannery's most explicit use of these concepts is in his pioneer paper on Mesoamerica: Archeological systems theory and early Mesoamerica, in *Anthropological Archeology in the Americas*, Anthropological Society of Washington, Washington, DC, 1968, pp. 67–87.

[41] I developed these ideas in several related papers that appeared between 1969 and 1976: Agricultural systems, ecosystems and the origins of agriculture, in Peter J. Ucko and G. W. Dimbleby, *op. cit.*, pp. 3–15; The origins of agriculture in the tropics, *American Scientist*, 1972, **60**: 180–93; The prehistory of tropical agriculture: an ethnoecological model, in *The Explanation of Culture Change: Models in Prehistory* (ed. Colin Renfrew), Duckworth, London, 1973, pp. 391–417; Traditional systems of plant food production and the origins of agriculture in West Africa, in *Origins of African Plant Domestication* (ed. Jack R. Harlan, Jan M. J. de Wet and Ann B. L. Stemler), Mouton, The Hague, 1976, pp. 311–56.

[42] For example in a paper written in 1973 in which I examined comparatively the agricultural and non-agricultural exploitation for food of a range of plant and animal resources: Alternative pathways toward agriculture, in *Origins of Agriculture*, (ed. Charles A. Reed), Mouton, The Hague, 1977, pp. 179–243.

[43] See, for example, my paper: Settling down: an evolutionary model for the transformation of mobile bands into sedentary communities, in *The Evolution of Social Systems* (ed. J. Friedman and M. J. Rowlands), Duckworth, London, 1977, pp. 401–17; and Barbara Bender's paper: Gatherer-hunter to farmer: a social perspective, *World Archaeol*, 1978, **10**: 204–22.

[44] Binford, Lewis R. (ed.) 1977. *For Theory Building in Archaeology. Essays on Faunal Remains, Aquatic Resources, Spatial Analysis, and Systemic Modeling*, Academic Press, New York, p. 6.

[45] The results of my attempts to reconstruct these patterns from ecological, ethnographic, and historical data have been presented in two main papers: Subsistence strategies across Torres Strait, in *Sunda and Sahul. Prehistoric Studies in Southeast Asia, Melanesia and Australia* (ed. J. Allen, J. Golson and R. Jones), Academic Press, London, 1977, pp. 421–63; Foragers and farmers in the Western Torres Strait Islands: an historical analysis of economic, demographic, and spatial differentiation, in *Social and Ecological Systems* (ed. P. C. Burnham and R. F. Ellen), Academic Press. London, 1979, pp. 75–109. The second phase of the project began in 1980 when A. J. Barham initiated a palaeoenvironmental investigation of Torres Strait. Some of the preliminary results of this work are reported in our joint paper: Prehistory and palaeoecology of Torres Strait, prepared for the Symposium on Quaternary Land–Sea Migration Bridges and Human Occupation of Submerged Coastlines held at the Scripps Institute of Oceanography, La Jolla, California, 26–30 October 1981.

[46] This project, entitled Early Manipulations of Plant Resources in Near Eastern Steppe and Riverine Forest, is financed by the Science and Engineering Research Council; the principal investigator is G. C. Hillman.

[47] Moore, Andrew M. T. 1975. The excavation of Tell Abu Hureyra in Syria: a preliminary report, *Proc Prehist Soc*, **41**: 50–77; *ibid.*, 1979. A pre-Neolithic farmers' village on the Euphrates, *Scientific American*, **241**: 50–8.

[48] Hawkes, J. G. 1969. The ecological background of plant domestication, in Peter J. Ucko and G. W. Dimbleby, *op. cit.*, pp. 17–29; *ibid.*, 1970. The origins of agriculture, *Economic Botany*, **24**: 131–3; *Crop Genetic Resources for Today and Tomorrow* (ed. D. H. Frankel and J. G. Hawkes), Cambridge University Press, Cambridge, 1975.

[49] Spriggs, Mathew, 1980. Learning from the past in the Pacific: the revival of ancient irrigation techniques for a market economy, 1980 Waigani Seminar: The Pacific Vision: the Past and the Present, Port Moresby, pp. 1–17.

[50] Huxley, Thomas Henry, 1864. *Evidence as to Man's Place in Nature*, Williams and Norgate, London. Huxley was primarily concerned with man's biological and evolutionary place in the animal kingdom, but his phrase has now acquired a wider ethnoecological resonance. D. J. Mulvaney used it in this latter sense in a paper read to the Australian Academy of the Humanities in Canberra in 1971: *Discovering Man's Place in Nature*, Sydney University Press, Sydney, 1971, pp. 1–12.

Rescue Archaeology in Sussex, 1980: A Seventh Progress Report on the Sussex Archaeological Field Unit

by PETER DREWETT (Ed.), OWEN BEDWIN and DAVID RUDLING

Introduction (Fig. 1)

During 1980 the Sussex Archaeological Field Unit continued its policy of selecting sites for excavation which fit into previously defined research projects (Drewett, 1977). Four sites, The Trundle, Bevis's Thumb, Stoughton Down and West Heath were selected as part of the Neolithic and Bronze Age Settlement Project. Oving, an important, recently discovered Iron Age settlement on the coastal plain, was excavated as part of the pre-Roman Iron Age Project. Excavations were also undertaken at Lancing in an attempt to locate Iron Age activity on the site of the Romano-British temple. Further excavations at Belle Tout, the excavation of a building platform and another lynchet section were undertaken as part of the Bullock Down Multiperiod Project. Finally four medieval tenements were excavated at Winchelsea, together with a small site in Seaford, as a concluding exercise in the Origin of Towns Project.

The Unit's four five-year projects (Drewett, 1977) are now in their final phases. The report on the Bullock Down Project will appear as a *Sussex Archaeological Society monograph*. Unlike the Bullock Down Project, the detailed excavation reports relating to the other three projects have already been, or are about to be, published. The somewhat limited funds made available by the Department of the Environment during 1980 were more than offset by the financial generosity of the Sussex Archaeological Society (Margary Research Fund), the East Sussex County Council (through the good offices of Dr A. Woodcock) and, in the form of services, from the West Sussex County Council (through Mr F. Aldsworth).

I. Excavations at The Trundle, 1980

by O. R. BEDWIN

A small area, *c.* 7 x 5 m, was excavated just inside the west entrance to the Iron Age hill fort, shortly before the construction of a new microwave aerial. A short stretch of ditch was revealed (Fig. 2), part of the so-called spiral ditch of the Neolithic causewayed

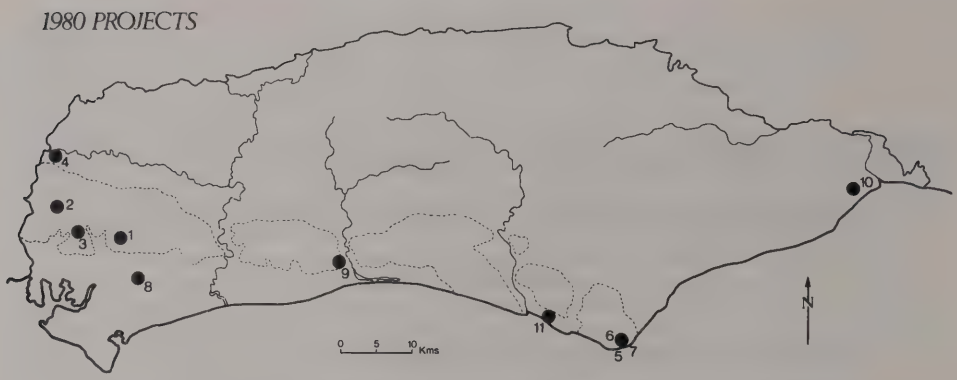


Fig. 1 Projects undertaken by the Sussex Archaeological Field Unit during 1980: 1, The Trundle; 2, Bevis's Thumb; 3, Stoughton Down; 4, West Heath; 5, Belle Tout; 6, Bullock Down Lynchet; 7, Bullock Down Site 70; 8, Oving; 9, Lancing; 10, Winchelsea; 11, Seaford.

enclosure excavated by Curwen in 1928 (Curwen, 1929). Indeed, part of the ditch contained some of Curwen's backfill. In addition, two post-holes were found (one of which was certainly recent) and a variety of modern disturbances.

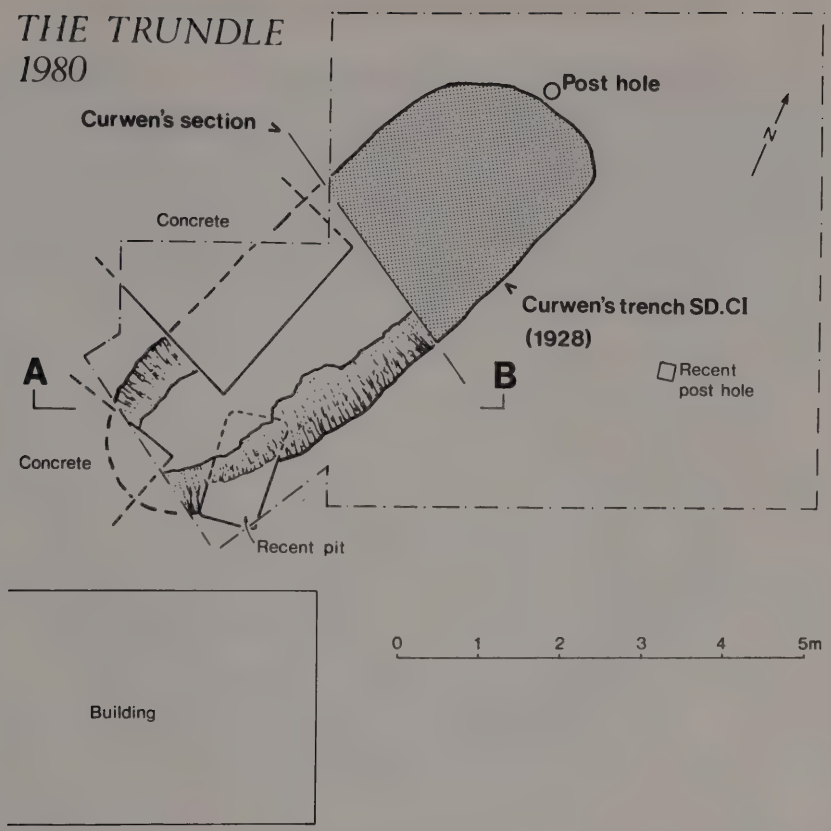
Excavation of that part of the ditch which had not been investigated by Curwen showed it to be a rather irregularly cut feature, *c.* 1 m deep at most. The ditch floor was wide and flat, and the sides sloping. No trace of a corresponding bank survived.

Artefacts from the ditch fill consisted of a little late Iron Age pottery, from layer 2 (Fig. 2), some Neolithic pottery, from layers 2–4, 68 pieces of struck flint (no implements) and three pieces of carved chalk. In addition, a small amount of animal bone was recovered from Neolithic levels (just enough for a carbon-14 date), and soil samples were taken for molluscan analysis. This latter, carried out by Dr K. D. Thomas, suggests that perhaps the Neolithic ditch was constructed in an area which had been extensively cleared of woodland just prior to the building of the earthwork.

II. A Sample Excavation at Bevis's Thumb, Compton, West Sussex

by P. L. DREWETT

A single trench, 1 m wide, was dug across the ploughed ditch of Bevis's Thumb long barrow to obtain dating and environmental evidence. A 50 cm wide strip was also dug across the berm to the edge of the surviving mound at the 1980 limit of ploughing. The ditch was 1.42 m deep and appears to have silted in naturally. The primary silts of chalk rubble (Fig. 3, layers 9–12) produced a few flint flakes and bone fragments. Immediately above these primary layers was a 'rubbish' deposit of dark, charcoal rich soil (layer 8) containing sherds of Early Neolithic pottery similar to that from The Trundle. The



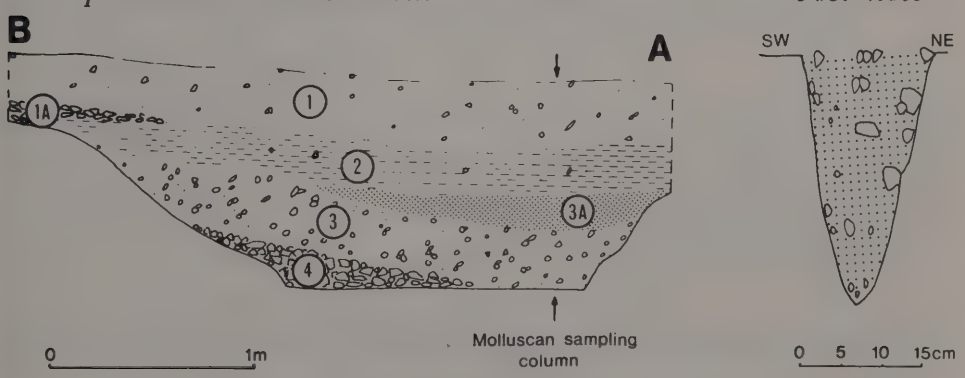


Fig. 2 Trundle, 1980. Plan and section of the excavation. Note different scales. Key to layers in the ditch section: 1, modern topsoil; 1a, loose rubbly chalk; 2, fine gritty fill of small chalk fragments in dark brown soil matrix; 3a, fine, soft, greyish white fill with some small fragments; 3, hard-packed layer of chalk rubble in soil matrix similar to 3a; 4, angular chalky lumps.

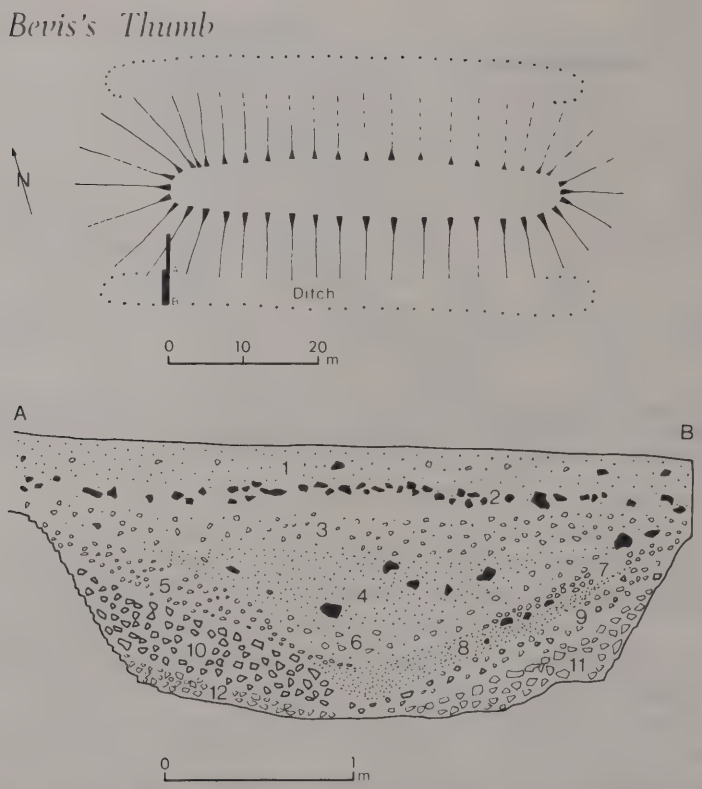


Fig. 3 Bevis's Thumb, 1980. Location of trench and ditch section. Key to layers: 1, modern ploughsoil; 3–7, secondary silts; 8, charcoal-rich 'rubbish' deposit; 9–12, coarse rubbly chalk primary silts.

secondary silts (layers 3–7) produced more flint flakes and Early Neolithic pottery, including a solid lug. The artefactual evidence suggests a date *c.* 3000–4000 BC. Charcoal samples have been sent for C-14 dating and soil samples will be used for molluscan analysis in order to compare the environmental evidence with the extensive information now available from the Sussex Causewayed Enclosures.

III. Sample Excavations at Stoughton I and II, Stoughton, West Sussex

by P. L. DREWETT

The two oval barrows on Stoughton Down look superficially like that excavated at Alfriston in 1974 (Drewett, 1975). A C-14 date from Alfriston, of 2360 ± 110 bc, suggests the possibility that the small oval barrows in Sussex may be a form late in the develop-

ment of long barrows. The environmental evidence from Alfriston suggested its construction in open country unlike the woodland setting of some causewayed enclosures. In an attempt to obtain further dating and environmental evidence from oval barrows, single trenches 50 cm wide were dug across the ploughed ditches of Stoughton I and Stoughton II (Fig. 4). The ditch of Stoughton I was 80 cm deep and that of Stoughton II 60 cm deep. A few flint flakes were found in each section, but no organic material suitable for a C-14 date were recovered. Soil samples were, however, taken for molluscan analysis.

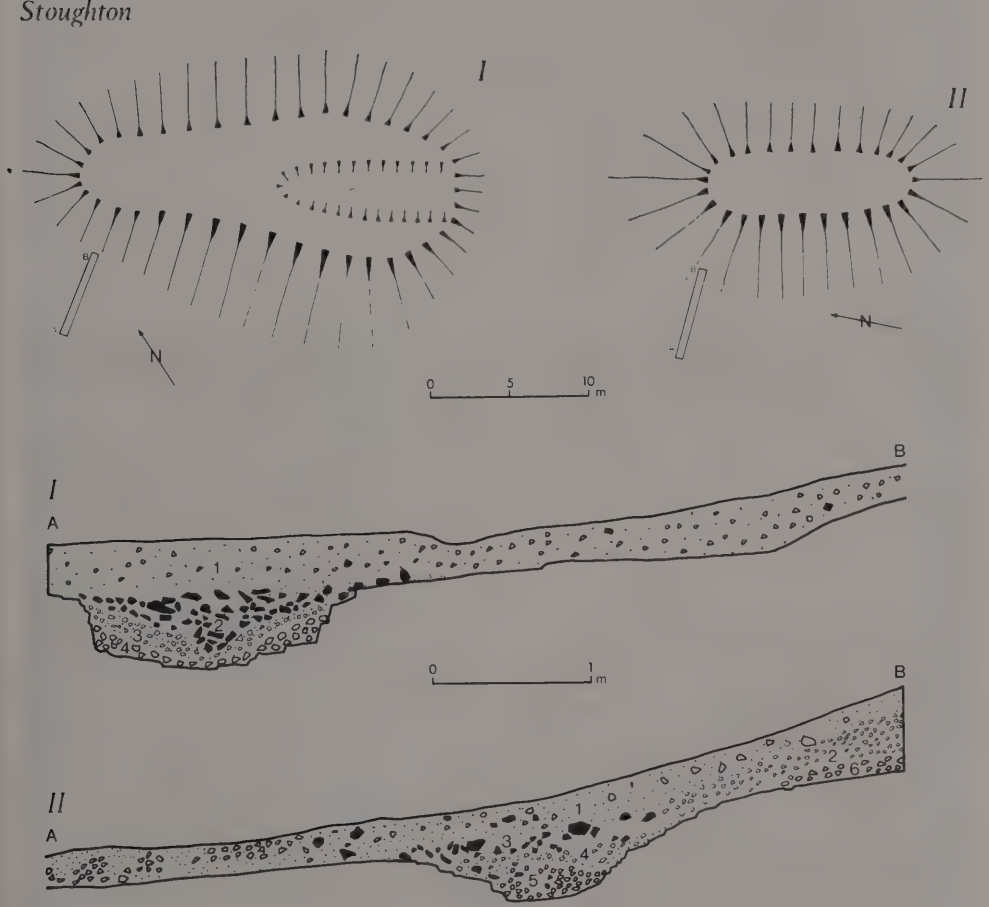


Fig. 4 Stoughton Down, 1980. Location of trenches and ditch sections. Key to layers: Stoughton I: 1, modern ploughsoil; 2, fine brown soil with large flints; 3–4, coarse rubbly chalk primary silts. Stoughton II: 1, modern ploughsoil; 2, 6, eroded barrow material; 3, fine brown soil with large flints; 4–5, coarse rubbly chalk primary silts.

IV. The Excavation of Five Round Barrows at West Heath, Harting, West Sussex

by P. L. DREWETT

During 1980 the five surviving barrows at West Heath were totally excavated. Barrows I–IV were excavated in 1973–5 prior to sand extraction (Drewett, 1976). The probable date range of the cemetery, based on C-14 dates from barrows I–IV, is 2100–1450 BC. When dates become available for barrows V–IX it may be possible to suggest the development of the cemetery. This can then be tied into the extensive environmental work currently being undertaken on the pollen, soils and charcoal from the site.

Barrow VII (Figs. 5 and 6) was the most complex structure excavated. It consisted of two concentric ditches (Plate I), an outer bank and a low central mound of sand heaped over a burial pit (Fig. 6). The ditches were an average of 1 m in depth and were probably steep-sided when first dug (Plate II). No artefacts contemporary with the barrow were found in the ditches. The only artefacts found were a few residual Mesolithic flints. The central pit contained a smashed urn mixed with cremated bone and charcoal.

Unlike barrow VII the other four barrows excavated (Fig. 5, barrows V, VI, VIII and IX) were simple turf stacks without ditches. The absence of ditches was confirmed by machine dug slots. The turf stacks forming barrows V and IX were very badly disturbed

Plate I West Heath, 1980. Barrow VII during excavation. (Photo: P. L. Drewett)

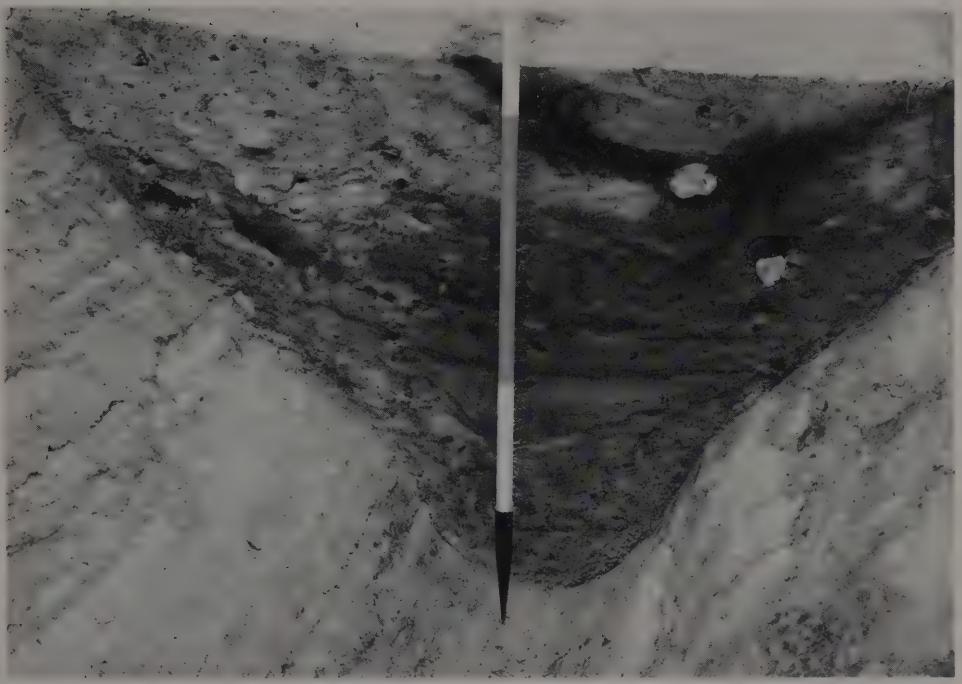


Plate II West Heath, 1980. Barrow VII. Section of inner ditch. Scale 1 m. (Photo: P. L. Drewett)

by rabbits and general erosion processes. Barrows VI and VIII survived with intact central turf stacks (Plate III). Barrow VI covered a pit containing five urns. The exact nature of these urns, and their contents, will have to await conservation. The actual pottery was, in all cases, like putty in consistency and encased in very hard iron-pan. The pots were therefore all lifted in blocks. It may be assumed that some, or all, contained cremations. Three other urns were found, two possibly in a primary context and one buried well up in the body of the turf stack.

Barrows V, VII and IX were simple turf stacks. A patch of charcoal was found off-centre under each mound and an attempt was made to locate burial traces using phosphate analysis. The only artefacts from these barrows were residual Mesolithic flints.

V. Excavations at Belle Tout, Eastbourne, East Sussex

by O. R. BEDWIN

A second season of excavation was undertaken at the large earthwork of Belle Tout in order to establish its date. (The first season's work had revealed the rather 'interrupted' nature of the earthwork, but no firm dating evidence: Bedwin, 1980a.)

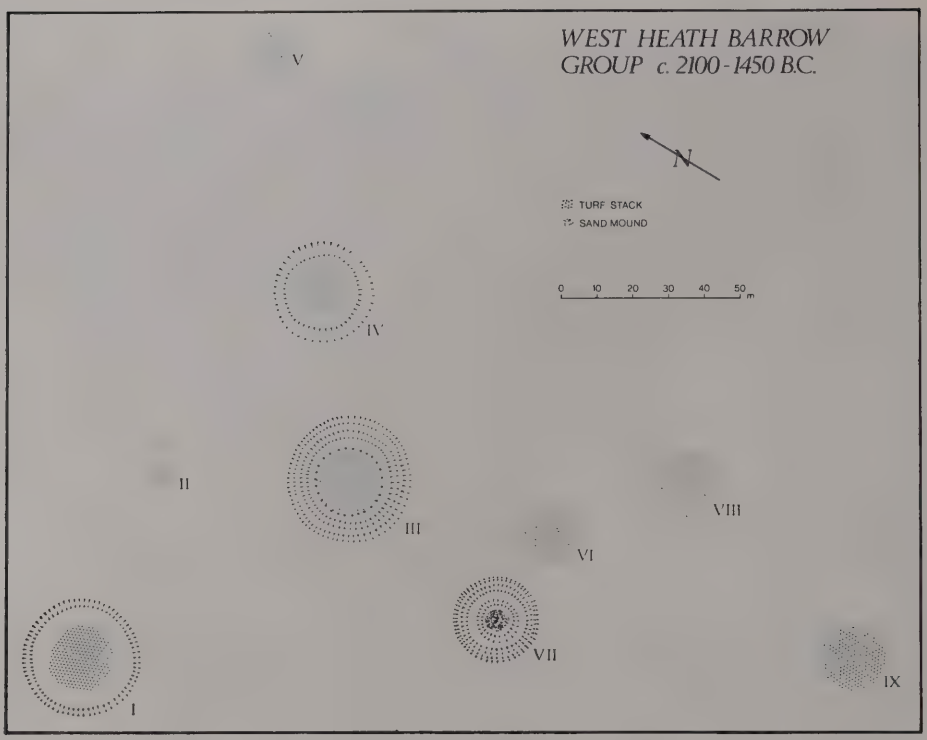


Fig. 5 West Heath, 1980. Barrow types excavated 1973–80.

The excavation was carried out at a conspicuous gap in the earthwork, at TV 5611 9580, just behind the clump of trees known as the Horseshoe plantation. Two ditch terminals were revealed, each 1.20 m deep (Fig. 7). A single section was cut through the bank, a simple chalk dump rampart with a well-preserved buried soil beneath.

The finds from this excavation, plus those from the 1979 work at TV 5561 9586, consisted wholly of flintwork, apart from two small medieval sherds and six pieces of Mayen lava. The flint assemblage consisted of 176 pieces of struck flint, 97% of which was waste. There were four scrapers and one serrated flake; the date of this assemblage is probably post-early Neolithic (Drewett, pers. comm.).

Hitherto, the large earthwork at Belle Tout has been considered to belong to the early Iron Age (Bradley, 1971), but the complete absence of Iron Age pottery makes this doubtful. More positive dating evidence is provided by the flintwork, though difficult to date with precision. However, since most of the activity *within* the earthwork is of Beaker or Early Bronze Age date, it could be of that date. The molluscan evidence, however, suggests a much later date with species in a primary context which do not usually appear prior to the Roman conquest.

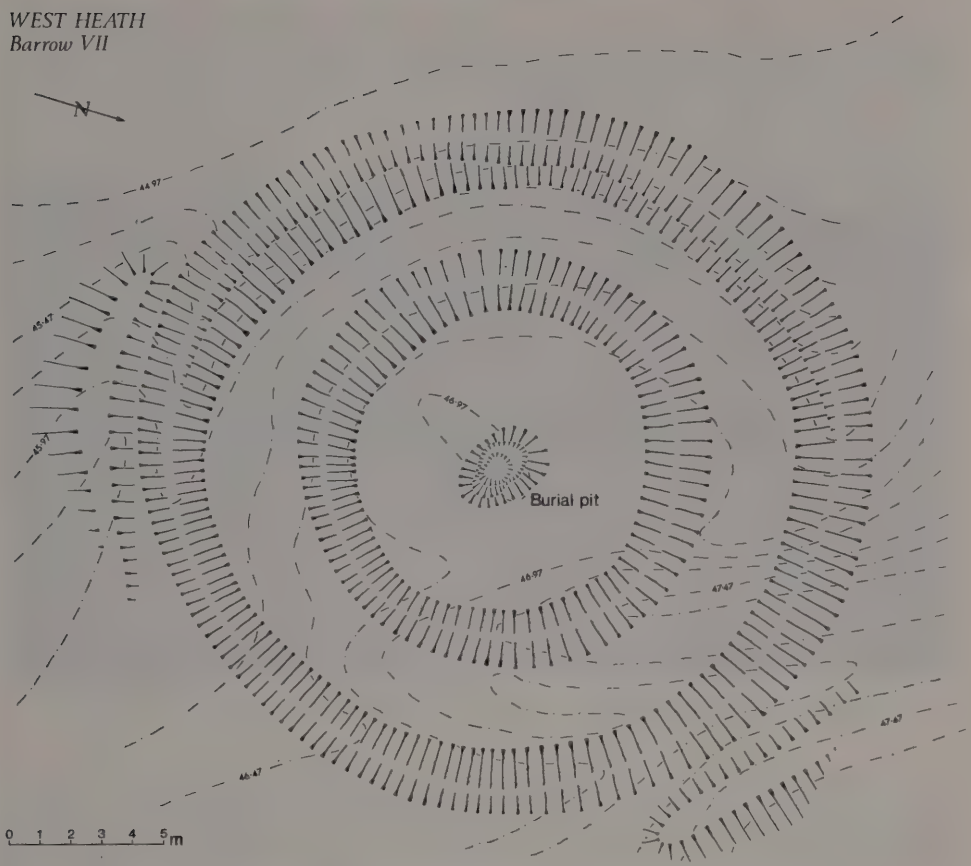


Fig. 6 West Heath, 1980. Plan of Barrow VII. Contours at 25 cm intervals.

VI. The Excavation of a Lynchet and the Systematic Fieldwalking of the Adjacent Field, Bullock Down, East Sussex

by D. R. RUDLING

As part of the Bullock Down Multiperiod Settlement Project the southern lynchet of a double lynchet trackway at TV 5796 9598 was excavated with the aim of trying to date the surrounding block of fields. The method employed was similar to that previously used elsewhere on Bullock Down (Drewett, 1977, 16–17; Rudling, 1979, 47–9), that is to cut a trench approximately 1 m wide, to straighten, clean and draw one of the sections. The section was trowelled back another 50 cm with all the finds being two-dimensionally recorded so that their plotted distributions can be compared with the data contained in the original lynchet section drawing (for an example of this see Rudling, 1979, 49).

Plate III West Heath, 1980. Barrow VIII. Turf stack. Scale 2 m. (Photo: P. L. Drewett)

Finds from the excavation included struck flints and fire-cracked flints, sherds of pottery, one piece of furnace slag, marine shells and charcoal. The majority of the struck flints were flakes, of which a few showed signs of retouch or utilisation. The only diagnostic implement was a leaf-shaped arrowhead with flaking on the tip and edges.

Of the 94 sherds of pottery found, 47 (34 are plotted finds) are of Late Bronze Age/Iron Age fabrics, particularly coarse flint gritted wares; 43 (14 plotted) are of hand-made, grog-tempered East Sussex Ware, which has a time span of Late Iron Age/the whole of the Roman period; and four (all plotted) extremely small sherds of uncertain attribution. Of particular interest was a rim sherd of an Iron Age 'Saucepan' pot. This sherd is of a grey, sandy fabric and has a plain rounded rim, below which are two horizontal grooves. Unfortunately, none of the East Sussex Ware sherds are sufficiently large or useful for dating purposes. The only definite specimen of Roman pottery was a small fragment of Samian Ware which was discovered while extending the lynchet excavation on to the trackway itself. (Three other sherds were also found on this trackway, all are undiagnostic examples of East Sussex Ware.)

In addition to the lynchet excavation, part of the field (No. 0002) situated immediately to the south was systematically fieldwalked using 60 30-m grid squares. The choice of this particular field was especially important since it had only recently been enlarged

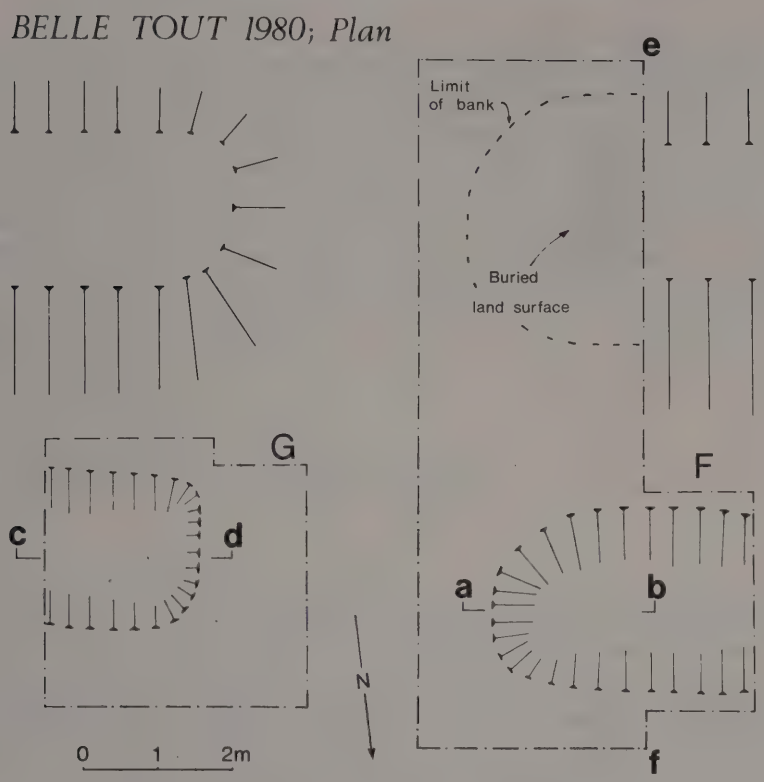


Fig. 7 Belle Tout, 1980. Plan of the excavation.

northwards and was the first ploughing in recent times of the extra land. It was also chosen with the aim of comparing the finds with those made from the nearby lynchet excavation.

The list of categories of finds from the fieldwalking included the same range as for the lynchet excavation with the additions of tile (Roman and post-Medieval), brick (post-Medieval), a few iron objects, modern glass and stone foreign to the site.

As in the case of the lynchet, the bulk of the flintwork consisted of struck flakes (with a small proportion showing signs of retouch or utilisation), but the range of distinctive implements was much larger. These included a flake axe, a fragment of a polished axe, a leaf-shaped arrowhead with flaking on the tip and edges, 10 short end scrapers, 10 short side scrapers, six round (disc) scrapers, one short double-ended scraper, one long end scraper, four notched flakes and five blade segments. In addition, 10 cores of various types were also found. All the flintwork described above is typical of the Neolithic and Bronze Age periods.

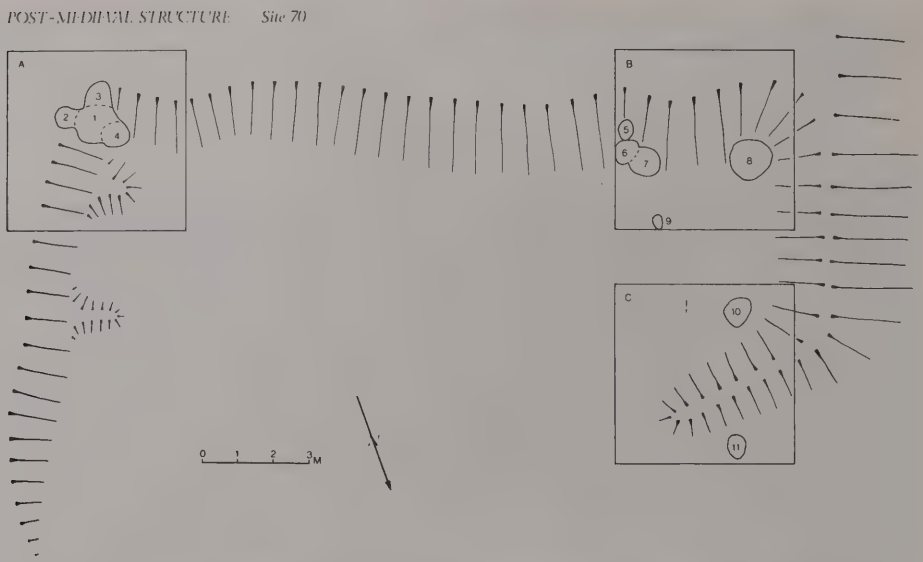


Fig. 8 Bullock Down, 1980. Plan of the trenches excavated on site 70. Post-holes 1–11.

Seven hundred and forty-three sherds of pottery were picked up and include one Neolithic (Peterborough Ware), two Beaker, 78 Late Bronze Age/Iron Age (mostly coarse, flint gritted wares), 648 Late Iron Age/Roman, 11 Medieval and three post-Medieval. Of the 648 Late Iron Age/Roman sherds 578 (89.2%) are of East Sussex Ware. The other 70 sherds are all Roman and comprise a variety of types of which Samian Ware is the most common (with 30 examples). Other fabrics present included sandy wares, imported amphora, Oxfordshire red colour-coated wares, Pevensey Ware and Thundersbarrow Ware (the last two types being typical of late Roman contexts in East Sussex). The maximum number of Roman sherds from any one grid square was 38 and it is thus reasonable to assume that there are no settlement sites within the area fieldwalked and that the potsherds, fragments of tile and so on, must have reached the fields as a result of manuring.

VII. The Excavation of a Building Platform on Bullock Down, Eastbourne, East Sussex

by P. L. DREWETT

As a result of considerable pressure from the owners of Bullock Down (not the tenant) the preservation of an important block of ridge-and-furrow fields in Bulling Dean has been cut to a minimum. Indeed, only the main core of this field system has now been scheduled as an Ancient Monument. Ploughing is therefore now encroaching on the area of protected permanent pasture. Unfortunately, just outside the scheduled area was a

building platform (Site 70) of unknown date or function. It was decided that, as part of the Bullock Down Project, an attempt should be made to date the platform. Three trenches, 5 m square, were therefore excavated (Fig. 8). Each trench produced post-holes which seem to indicate a large fenced area rather than a building. The main corner post-holes (1 and 8 on Fig. 8) were 1 m in diameter, indicating very large posts. Only 19 sherds of pottery were found. These were all small abraded sherds of Iron Age and Romano-British date and must be considered residual. Given the location and nature of the structure, together with an absence of domestic debris, an agricultural function is suggested. The size of the posts appears to rule out the possibility of a sheep fold. It is possible that the structure represents an oxen or bullock yard, both types of animal being present on the Downs in the post-Medieval period.

VIII. Excavations at Copse Farm, Oving, West Sussex

by O. R. BEDWIN

Background

One of the main aims of SAFU's Iron Age Project has been to investigate the nature and extent of Iron Age occupation of the Coastal Plain in West Sussex, an area hitherto rather neglected. In 1975 and 1976, the Unit carried out the first large-scale excavation of an Iron Age settlement at North Bersted, Bognor Regis (Bedwin and Pitts, 1978), following chance finds made in a drainage trench. Part of the plan of the settlement (including a circular hut), plus an associated field system, was established. In 1978, an attempt was made to carry out the first excavation in Sussex of an Iron Age salt-working site, at Chidham; in the event, the excavation showed that most of the site had been lost through coastal erosion since its discovery several years previously (Bedwin, 1980).

Recently, however, the Archaeological Officer for West Sussex, Mr F. G. Aldsworth, brought to the author's attention a series of well-defined soil marks visible on aerial photographs of the area around Copse Farm, Oving, about two miles east of Chichester. These soil marks, all on a narrow strip of low-lying, freshwater alluvium, defined a series of enclosures, linked by trackways (Fig. 9: to anticipate the results of excavation, the soil marks correspond to ditches, some of which are quite substantial). The importance of these soil-mark sites, none of which is visible on the ground, is twofold:

(i) They are the only group so far known on the Coastal Plain in Sussex. Where similar sites appear in other counties, they are usually of Iron Age and/or Roman date.

(ii) Following on from (i), the opportunity for excavation of an Iron Age settlement on the Coastal Plain presented by these soil marks is at present unrivalled; they can be used to guide excavation in a way which is not possible on any other site.

COPSE FARM, OVING

IRON AGE & ROMANO-BRITISH SETTLEMENT

Fig. 9 Copse Farm, Oving. General plan showing soil marks and trenches A–D. (By F. G. Aldsworth)

A programme of preliminary excavation of these sites, which are all ploughed annually, was therefore carried out in August and September, 1980.

Excavation

Four trenches were excavated (Fig. 9); three of these, trenches A, C and D, were small trial trenches dug by hand. Trench B, measuring 30 x 25 m, was cleared of ploughsoil by machine, and all features subsequently identified were excavated by hand.

Trench A revealed a single ditch, *c.* 1 m deep, with a narrow, flat bottom. There were no finds in the lower silts, making construction of the ditch difficult to date, but its appearance suggests that it is Roman. The lack of finds further indicates that no settlement is nearby.

The aim of trench B was the total excavation of a small rectangular enclosure visible on aerial photographs (Figs. 9 and 10). The four enclosure ditches proved rather different; those on the south and west were substantial, up to 1.5 m deep, and with at least two re-cuts visible in some sections (Plate IV). By contrast, the ditches on the north and east were much smaller, and there was also a simple entrance on the eastern side (Fig. 10). The differing nature of these ditches suggests that the excavated enclosure is merely part of a much more extensive enclosure defined by the larger ditches.

The excavated enclosure and the features within it are dated by the pottery to the late Iron Age (with a little overlap into the Roman period, indicated principally by the final re-cut in the south ditch). In addition to the plentiful pottery, there were considerable amounts of animal bone, charcoal, burnt flint, burnt daub and slag. (There was also a little flintwork, mostly scrapers, which may be residual.) The amount and nature of these finds indicate a settlement, but the only feature which could be interpreted as a hut is a circular ring-gully, *c.* 7 m internal diameter, half of which lies under the baulk, and which is in any case just outside the enclosure. The features within the enclosure, notably the working area with its irregular cluster of post-holes and the four-post-hole structure (? a granary), point rather to this being a 'working enclosure', perhaps for farmyard-type activities and small-scale industrial use. This latter is reflected in pit 60, which contained many large, well-preserved pieces of burnt daub, several with three or four adjacent wattle impressions, presumably derived from a hearth lining. Also from this pit came a considerable amount of charcoal, again in large pieces, plus a little iron slag. The main focus of hut sites could therefore be to the east and north of the excavated area.

Trench C was dug to date archaeological activity in the area of the soil marks to the north of Copse Farm buildings (Fig. 9). The only feature found was a shallow one, perhaps a gully, or possibly even a beam slot, but Romano-British pottery was plentiful.

The purpose of trench D was to date the irregular enclosure to the east of Copse Farm buildings by means of a section through the ditch. Unfortunately, a modern drainage ditch was encountered, preventing further excavation, and there was no opportunity to section the enclosure elsewhere.

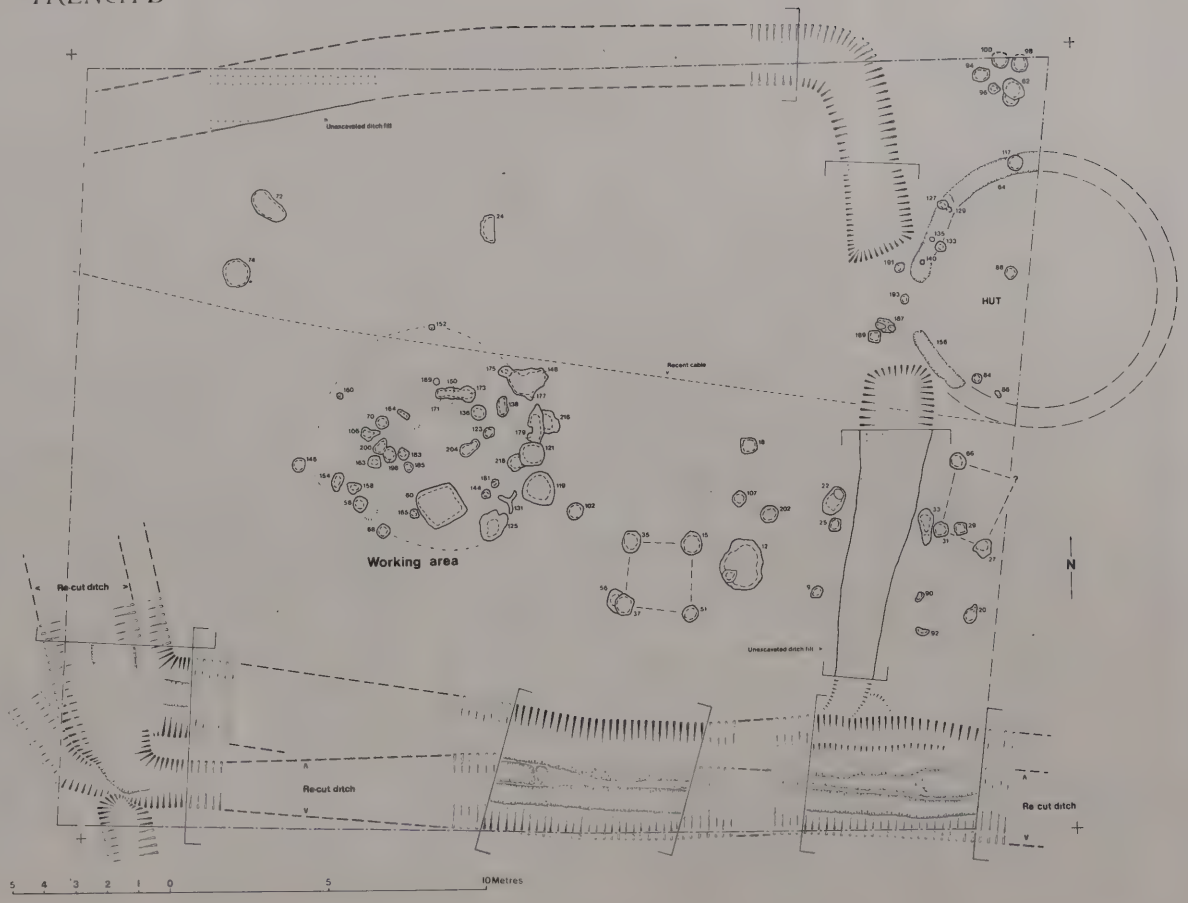


Fig. 10 Copse Farm, Oving. Detailed plan of trench B. (By F. G. Aldsworth)

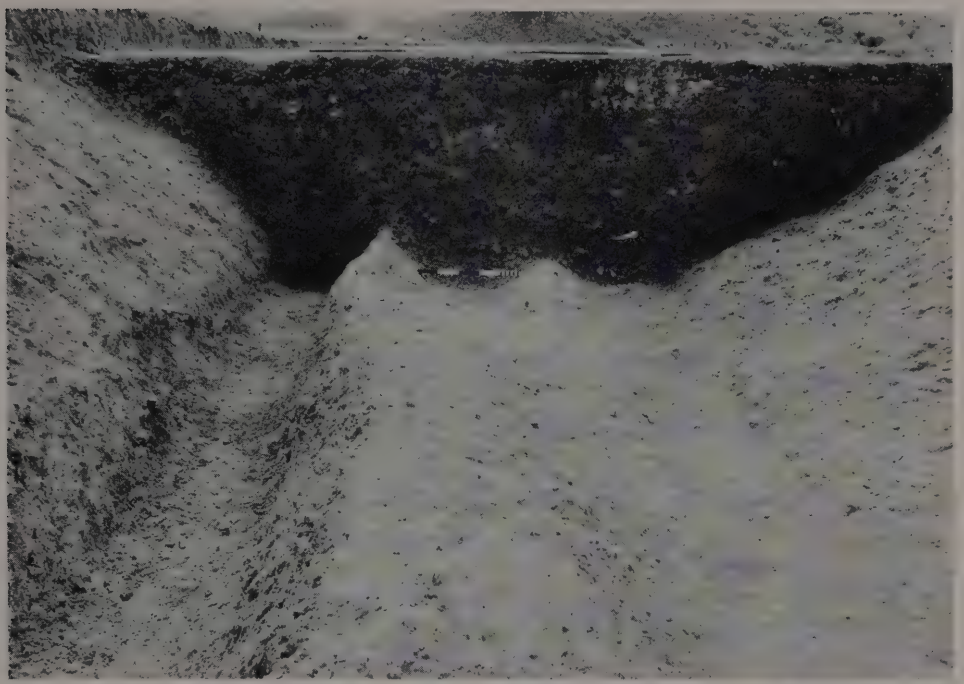


Plate IV Copse Farm, Oving. Section through the ditch forming the south side of the enclosure in trench B, from the east. Scale 2 m. (Photo: O. R. Bedwin)

Results

The findings of the 1980 excavations suggest the following chronological sequence:

1. Some exploitation of the area when it was still a freshwater lake or marsh, in the Neolithic and/or Bronze Age. This is reflected in the low, but constant, level of flintwork found wherever excavation took place.
2. The first permanent settlement, requiring considerable drainage of this low-lying area, was dated to the late Iron Age, with continuity into the Roman period. (Positive dating of the enclosure to the east of Copse Farm may extend this range.)
3. No early Saxon settlement is known in the area, and it may therefore have been largely abandoned until the later Saxon period, since when settlement has probably been virtually continuous.

IX. Excavations at Lancing Down, 1980

by O. R. BEDWIN

In 1828, the well-preserved remains of a Romano-British temple were discovered on Lancing Down. These consisted of substantial mortared flint footings of the characteristic

'square within a square' type; inside the temple was a tessellated pavement, and outside it a number of pits, some of which contained Roman cremation burials. The temple remains were displayed to the public for a few years, but in 1833 the whole site was grubbed up by the farmer (Frere, 1940).

It was decided to re-investigate the site, as part of SAFU's Iron Age Project, for two reasons:

(i) When the site was first discovered, a considerable number of Iron Age finds were made, in addition to the Roman material. It therefore seemed likely that an Iron Age temple could have preceded the Romano-British one, at, or near, the same site.

(ii) The County Archaeological Officer for West Sussex, Mr F. G. Aldsworth, had recently noted on an aerial photograph an oval soil mark at the site. This soil mark, *c.* 40 m across at its widest, could have represented a temenos ditch, and this could only be confirmed by excavation.

Part of the temple, and over half of the area enclosed by the soil mark is now ploughed annually (i.e. all the land to the north-east of the fence in Fig. 11), and excavation was carried out for three weeks in September 1980.

The main area, trench A (Fig. 11), was cleared of ploughsoil largely by machine. Trenches C–F were dug by hand. The feature responsible for the oval soil mark was shown to be a shallow gully with a number of post-holes along it at irregular intervals. The variation in size, shape and spacing of these post-holes suggests that they are of different phases. Part of this temenos gully was overlain by traces of a later entrance structure, consisting of two parallel lines of unmortared flint nodules running towards the entrance of the Romano-British temple (Fig. 12). It would appear that the temenos gully ended at post-hole 126 when this later entrance was in use.

Within the area enclosed by the gully, one corner of the temple masonry was uncovered, but was in poor condition, consisting of one course (or at the most, two courses) of roughly shaped flint nodules. The inner wall was well bedded in mortar; the outer one contained only traces of mortar. Using the dimensions of the temple recorded in the 19th century, and projecting them from the masonry uncovered in 1980, it is clear that the temple was not situated centrally within the temenos; in fact, the southern edge of the temple appears to overlie the temenos (Fig. 11), and it would be useful to examine this by excavation.

Between the temple and the temenos were the remains of a square structure, presumably wooden, *c.* 3.5 m across (Fig. 12). This consisted of a four-sided shallow gully with a small post-hole in two of its four corners, inside a three-sided square gully, with post-holes at each of its four corners (Plate V). In addition there was a central post-hole, and faint traces of a very narrow circular feature, 4 m in diameter, enclosing the whole structure. The lay-out of this unusual structure, (a 'square within a square'), its position near the Romano-British temple, and the fact that its alignment is the same as that of the temple, all point to a religious significance, and so, bearing in mind its small size, it has

LANCING DOWN

ROMANO-CELTIC TEMPLE & IRON AGE SHRINE

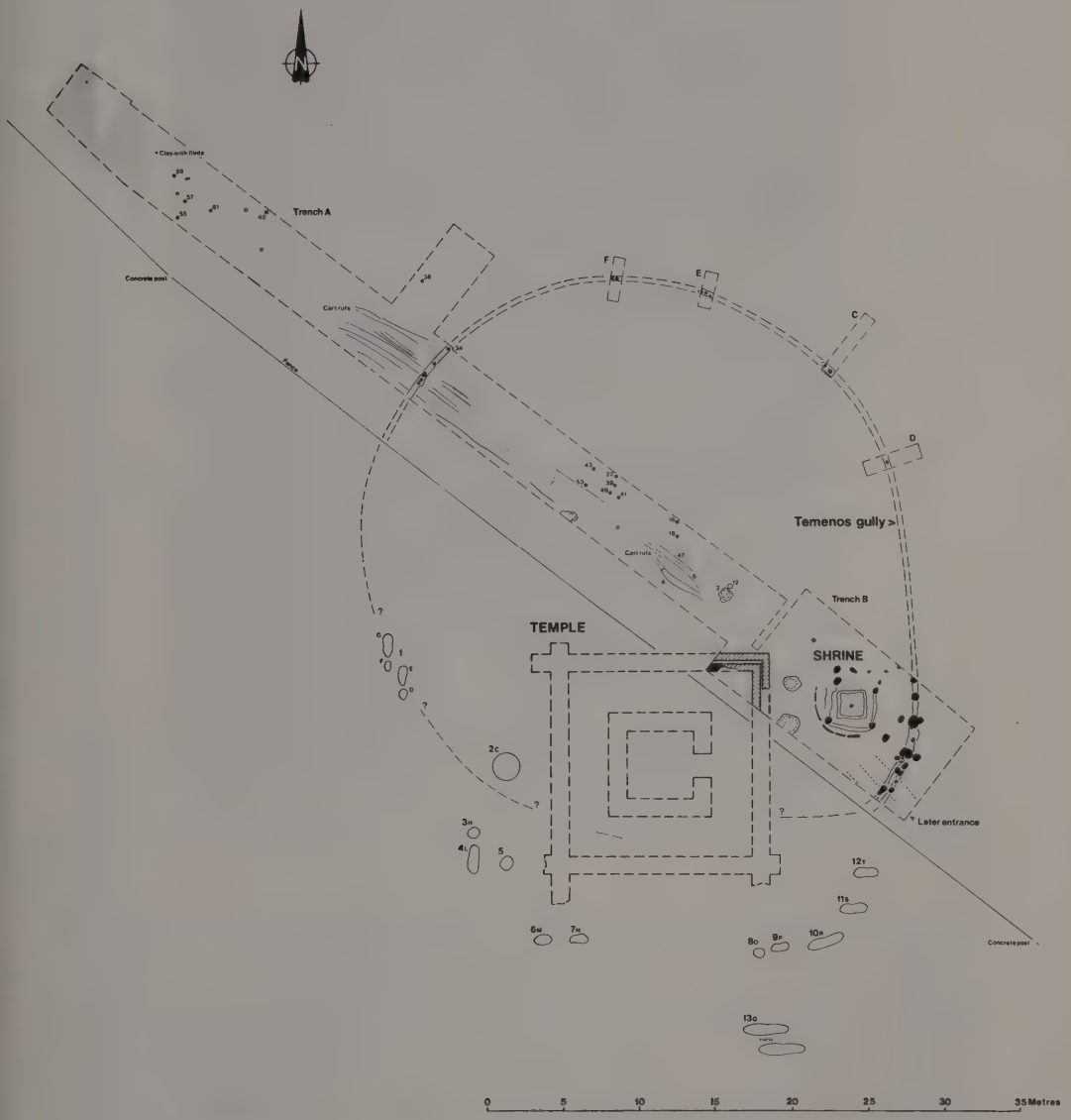


Fig. 11 Lancing Down, 1980. General plan of the excavations. (By F. G. Aldsworth)

LANCING DOWN

IRON AGE SHRINE

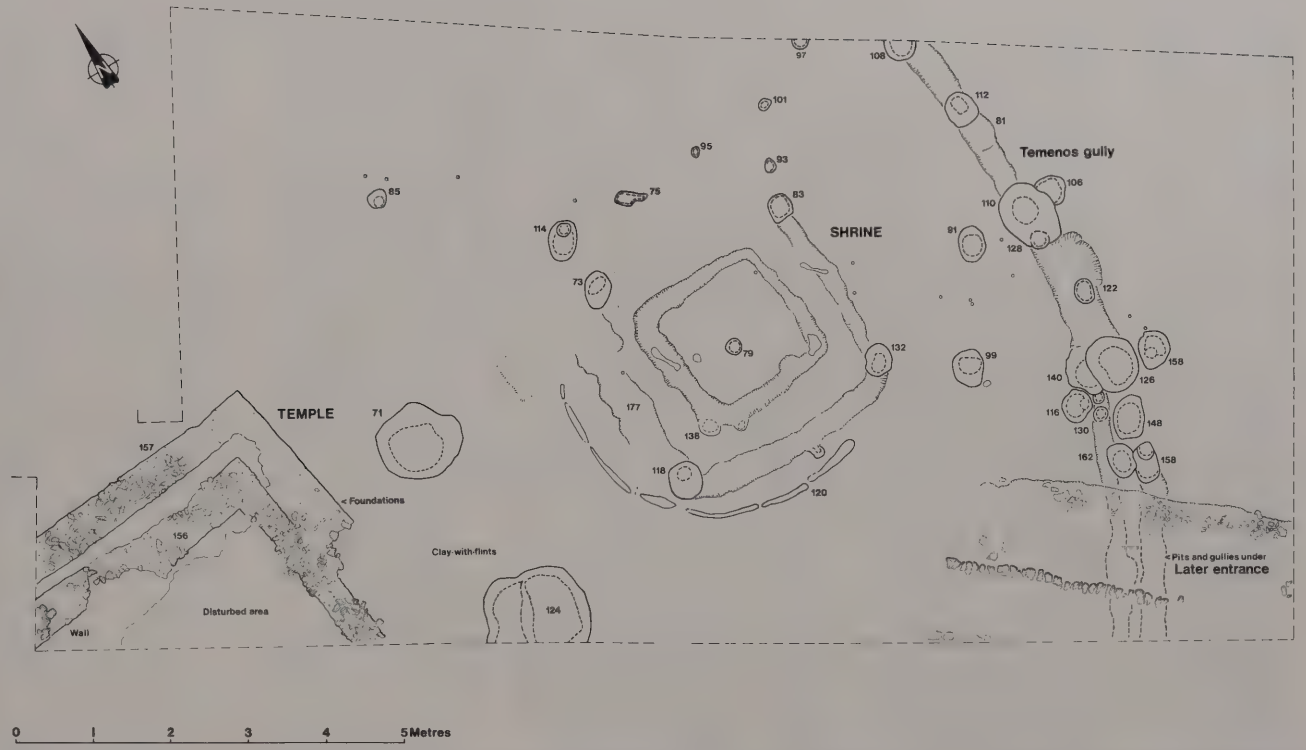


Fig. 12 Lancing Down, 1980. Detailed plan of the south-eastern end of trench A showing temple masonry, shrine and temenos gully. (By F. G. Aldsworth)

Plate V Lancing Down, 1980. General view of the surviving temple masonry (background), the shrine, and the temenos (foreground) from the south-east. Scale 2 m. (Photo: O. R. Bedwin)

been called a shrine. A crucial consideration is its date. No comparable structure is known anywhere in Sussex, and indeed parallels from any site in southern England are hard to find. Possible examples are some square wooden structures found inside Danebury (Cunliffe, 1978) and a four-post structure, 4 m across, within a circular gully, at Winchester (Biddle, 1965). All these belong to the late Iron Age; pottery from the Lancing shrine was almost entirely East Sussex Ware, which may be dated from the 1st century BC to the 5th century AD. Whatever its chronological date, however, it would certainly be fair to claim that the Lancing shrine belongs to a pre-Roman tradition.

Apart from the temple, the shrine and the temenos gully, few features were found. There were a number of individual post-holes (Fig. 11) often containing flint packing stones, and a series of roughly parallel cart ruts at the north-western end of trench A. These were of 19th century date and presumably were made by farm carts being obliged to go round the temple site at that time.

X. Excavations in North Street, Winchelsea

by D. R. RUDLING and D. MARTIN

In advance of proposed building work an excavation and architectural survey were undertaken on land immediately to the east of No. 1, The Five Houses, North Street, Winchelsea. This plot of land, which has a street frontage of approximately 23 m, was formerly part of Quarter II of Edward I's planned town of New Winchelsea (established between 1283 and 1292). W. Maclean Homan, in his 'Plan of Winchelsea as originally laid out reconstructed from the rent roll of 1292' (Homan, 1949) shows 15 tenements along the north side of Quarter II, with either four or five tenements for the site investigated this year, of which two were stated in the Schedule of Decayed Rents of 1363 to be 'waste, burnt and uninhabited'. The site is bordered to the east by a standing medieval wall, while to the west there are late 13th/14th century cellars under The Five Houses.

The principal aims of the investigations in 1980 were to check the 1292 survey for accuracy, to compare the size, status, periods of use and alterations to, a group of adjacent tenements, and to obtain much needed pottery groups related to datable structures.

An architectural survey was undertaken of the medieval standing wall and this was shown to form the western boundary of an adjacent property which comprised a 6.6 m wide front range, set parallel to the road and a secondary wing to the rear. In the north-west angle of the latter were the remains of a contemporary angle-set two-flue fireplace incorporating much yellow 'Flemish' brick. Beneath the wing, excavation revealed the end wall of a narrow vaulted cellar. The western face of the medieval wall incorporated the broken remains of a cupboard recess which originally served Building 1.

The excavations (Fig. 13) revealed traces of a maximum of five tenements but unfortunately, due to extensive destruction caused by gardening and the presence of several very large trees, no complete plans of the buildings were obtained. Assuming these to be five buildings, moving westwards from the standing masonry described above, the first messuage would have utilised the wall as its eastern boundary, but its western one is to some extent uncertain, although roughly marked by a drain comprising a base of sandstone slabs and sides of yellow brick. The evidence for the front wall consisted of post-holes and a sill beam trench, thus showing the building to be of timber construction. Excavation revealed no further traces of this structure.

The second building also made use of sill-beam foundations laid within a trench for the front, rear and west walls (where sampled the east wall was entirely destroyed), and at least two phases of construction can be demonstrated on the basis of the evidence obtained

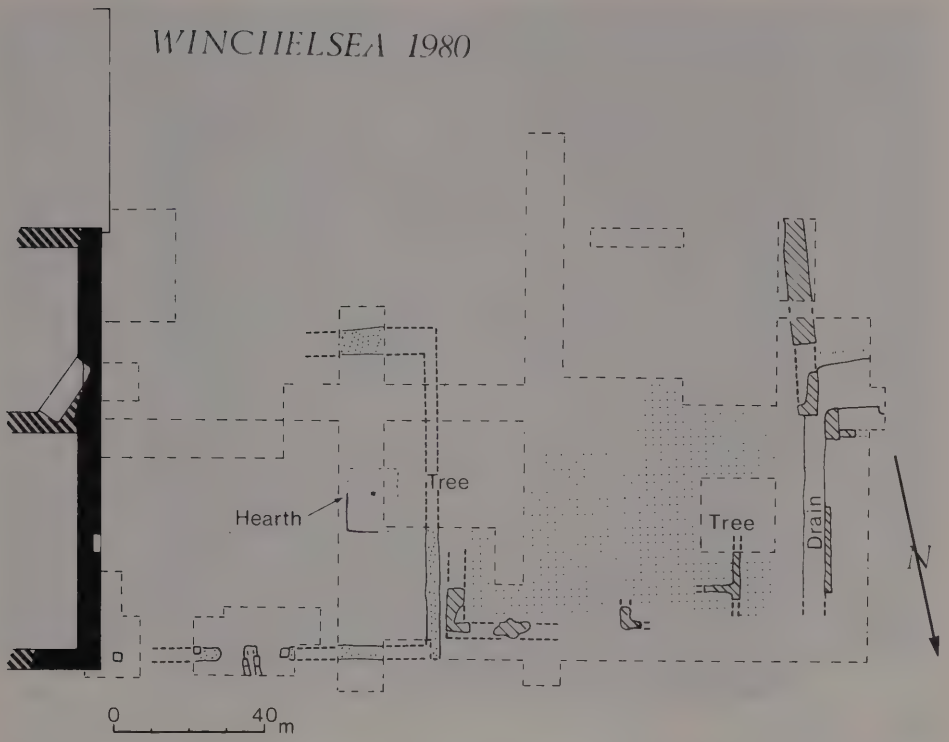


Fig. 13 Winchelsea, 1980. Plan to show position of trenches and architectural features, including the crushed sandstone layer.

from the front wall. In the centre of this structure were the remnants of an open hearth constructed of yellow bricks (Plate VI), this being very similar in design to another yellow brick hearth recently discovered on the tenement immediately to the north of Blackfriars' Barn, Quarter XV.

Building 3 was of uncertain construction (? clay-bedded stone walls), the fragmentary north-eastern corner being the only part discovered.

Building 4 showed two techniques of construction, timber framing set upon drystone foundations, and clay-bedded masonry walling for the western wall. These two building techniques have been noted elsewhere in Winchelsea; drystone foundations at the site next to Blackfriars' Barn and clay-bedded masonry walls at German Street (observation by D. Martin). At the front, the western boundary of messuage 4 is marked by another drain (Plate VII), in this instance built partly of yellow bricks and partly of sandstone. A layer of crushed sandstone was discovered within the area delimited by the walls of Buildings 3 and 4 (Fig. 13) and this is interpreted as a floor. Perhaps this indicates that at some stage the two buildings were merged to form one.

Plate VI Winchelsea, 1980. Building 2: an open hearth made of yellow bricks. Scale 20 cm. (Photo: D. Martin)

Little is known about tenement 5. On its eastern flank is the drain mentioned above and next to this traces of drystone wall. At the rear is a narrow paved area which was served by the drain.

The dating of the various architectural discoveries must await a detailed study of the associated artefactual findings, particularly the pottery. It is also hoped that documentary research will be useful in this matter, and perhaps help to clarify the number of tenements involved. Of particular interest from an architectural point of view, however, is that the excavations have demonstrated a variety of construction techniques for a group of adjacent tenements, the use of the technique involving still-beam foundations laid in a trench being previously unrecorded for Winchelsea. Also of interest is the fact that the street line appears to have been 'stepped' (Fig. 13).

Running obliquely under Buildings 3, 4 and 5 and with no respect to their alignments, was a ditch. This contained very few finds, mostly bones with just a few pieces of medieval pottery in the upper fill. The ditch is possibly agricultural and dating to before the founding of New Winchelsea.

Finds from the excavations in general include potsherds ranging in date from the 13th/14th centuries to post-medieval times, building materials including fragments of a

Plate VII Winchelsea, 1980. Drain between Buildings 4 and 5. Scale 2 m. (Photo: D. R. Rudling)

roof finial, iron and bronze objects, of which a number of iron fishhooks and a well-preserved rondel dagger are of particular interest, quantities of slag and large numbers of animal bones and oyster shells.

Observations of a cable trench, Winchelsea

In February 1980, Seeboard cut a cable trench between a new motel on the A259 at TQ 9050 1758 and the children's playground, Rectory Lane, Winchelsea. The route followed was first due north from the motel, past the western end of Hogtrough Lane, then cutting the bank just to the north of the north-west corner of the allotment gardens, crossing the playing field in a line just north of the north-west corner of the bowling green and the village hall, before finally following the southern boundary of the children's playground. At the request of the Department of the Environment, the Unit undertook a watching brief of the excavations and observed them for their entire duration. On average the cable trench was approximately 35–40 cm wide and about 65 cm deep. The small size of the trench must be borne in mind when evaluating the negative data resulting from the watching brief.

The cable trench cut across the presumed lines of the two systems of town defences (that constructed during the reign of Edward I; the other relating to a redefence of the

town in 1414), but in both cases no traces of any wall or post-holes were discovered. With regard to the 13th century wall it is possible that at this location the cable trench did not go deep enough to uncover such foundations, while in the other case it may simply be that the wall planned in 1414 was never completed at this point.

The trench also crossed areas of land (Quarters XXI and XXII) inside the presumed lines of the medieval town defences and it was thus possible that evidence of medieval buildings would be revealed. Although no definite signs of any walls or buildings were noticed, pieces of roofing tile and slate were found along the whole length of the cable trench, and in the area of the present-day children's playground (adjacent to the village hall) a number of medieval yellow 'Flemish' bricks were discovered, and several flat pieces of sandstone observed at two spots in particular, in one instance close to a patch of mortar. Unfortunately, due to the very small size of the trench, it was impossible to say with any degree of certainty whether these two concentrations of sandstone fragments represent walls; however, together with the discovery of pieces of medieval pottery, they suggest that a medieval building once occupied this location.

XI. A Trial Excavation in Broad Street, Seaford

by D. R. RUDLING

As a continuation of the Unit's previous policy of investigating medieval Seaford (Freke, 1978; Freke, 1979; Freke 1980) and at the request of East Sussex County Council, who provided the necessary finances, the opportunity was taken in 1980 to conduct a small trial excavation on the former Post Office site, 33 Broad Street (immediately north east of the church).

A J.C.B. was used to cut a trench 11.2 m long by 1 m wide. Most of the area investigated proved to have been disturbed by relatively modern foundations, but elsewhere the main impression obtained was one of almost completely sterile silty-clay soils above the natural chalk. The only discoveries were two post holes, two sherds of medieval pottery (one being a sagging base of coarse flint gritted ware, probably dating to the thirteenth century), a piece of slate, tile and an oyster shell. One of the post holes was completely excavated, but unfortunately yielded no dating evidence, the only finds being fishbones, a few carbonised seeds, and very small fragments of charcoal.

Acknowledgements

The Sussex Archaeological Field Unit would like to thank the numerous people who made this year's projects possible, particularly the owners and tenants of the sites for allowing us to work on their land, and all those who helped in any way. The names of the following must be mentioned at this stage, although detailed acknowledgements will be made in the final reports:

The Department of the Environment and particularly Mr S. Dunmore, East Sussex County Council, and Dr A. Woodcock, West Sussex County Council, and Mr F. A.

Aldsworth, Mr E. D. Williams, Mr S. Borrow, Mr Pitts, Lancing College, A. B. Bray and Son, Mr R. C. Langmead, Mr R. Holgate, Mr P. Leach, Mr P. Garwood, Mr J. Mills, Mr M. Roberts, Mrs P. Hinton, Dr K. Thomas, Mr T. P. O'Connor, Seeboard, Mr and Mrs Luck, Mrs B. Martin, Mr J. Paddock, Miss A. Jones, Gamble, Cook and Warner, Mr J. Bell and HAARG.

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The Roman Coins from Richborough—A Summary

by RICHARD REECE

The excavation of the Roman fort at Richborough in Kent during the 1920s and 1930s continued the tradition of total clearance of selected archaeological sites which the Society of Antiquaries had earlier applied to the Roman town of Silchester. The material resulting from such enterprises was prolific and it is perhaps as well that the pottery was sorted, only a part was kept, and the rest was discarded. No such fate befell the 56,000 coins found so that they all survived the excavations intact, and, for the most part well examined, identified and published. The delay which attended the publication of the fifth and final report meant that the excellent typescript and manuscript prepared by B. W. Pearce for the final coin list was still unpublished years after his ashes had been scattered in the area of St Augustine's chapel in the fort; it was in 1964 that Barry Cunliffe approached me to ask if I would edit Pearce's report for publication, and perhaps consider some sort of summary of the Richborough coins in general. This work on the Roman coins was to fit in with work by Derek Allen on the British coins and Stuart Rigold on the post-Roman coins. The earlier and later coins were to be measured in only tens and the other two workers completed their tasks and their reports are to be found in Richborough V. The tens of thousands of coins defeated me at the time, and in this summary, published 15 years after starting work, I would claim only to be putting forward the basic facts so that other people may use them. A full catalogue is still a hope for the future though this hope is now fairly realistic and a lot of very detailed work has been done both in examination of groups of coins and in interpretation of the lists and their comparison with other sites.

The summary lists in Richborough V were made solely from the manuscripts and published accounts of the coins found. I had at one stage the hope of checking the coins, and visited the site museum at Richborough to prepare a plan of action. The state of the coins was at once orderly and chaotic, for as they had been identified each season and returned to the museum the various containers had been carefully stored away in the coin cupboard to await a final sorting which had never happened. Instant checking was impossible, so the summary of published sources was completed, and as that awaited publication the second stage of study began. First came an exchange of letters with Gerald Dunning, then in charge of Ministry of Works Museums. He quickly appreciated the problems, and after an abortive attempt to plan a period of study at Richborough, he quickly agreed

that the job was going to be a long one and that I would need to take all the coins away. Negotiations then followed with Stuart Rigold which culminated in a meeting at Richborough one snowy spring day in 1965 at which I took delivery of the coins, still in their containers, and signed a receipt which specified numbers of containers of very varied shape and form, but failed to mention anything about the numbers or types of coin.

The first part of the job that I tackled was the sorting and packeting of the very large numbers of coins of the House of Theodosius which accounted for nearly half of the total. The next work that was done was a detailed study by Norman Shiel on the coins of Carausius and Allectus. He published various notes on types found and included the information in his work on the period (Shiel, 1977). He provided a detailed manuscript catalogue which forms the basis for the relevant part of this summary; we hope that the full catalogue will be published in the final Richborough coin list. Michael Hammerson next worked on the coins of the period 330–348 and included a detailed examination of the regular coins, the copies, and the criteria for deciding between them in his M.Phil. thesis in the University of London (Hammerson, 1980). His catalogue is so detailed, and the visual arguments are so much a part of the whole that I have made no attempt to summarise his work here. The coins of the period are simply divided by size into 'Likely Regular Coins' and 'Likely Copies' which is a very crude division, but, judging by numbers, one which gives a reasonable idea of the material very briefly.

After this, work went forward more quickly with the employment of Christopher Catling for three months to finish the sorting. He checked all the earlier coins, gave modern references to the coins of the 4th century, and arranged the series in chronological order with a card catalogue index. Judy Medrington then prepared a typed summary from the lists, and John Boden typed out a detailed catalogue of the coinage up to the reform of Diocletian. Throughout the work the Ministry of Works, now the Ancient Monuments division of the Department of the Environment, have given complete support, both in encouragement, and, when needed, finance. That the work ever started was due to the enthusiasm and flexibility of two of the more remarkable Inspectors of that body, Gerald Dunning and Stuart Rigold, and it is good to remember them in this summary. Neither would have been in the least surprised that the Richborough Problem outlived them; both, I think, would have been pleased to see one step more achieved in its final solution.

The study of the Richborough coins has progressed in two rather different forms, quantitatively and qualitatively. The study of sheer numbers began in Richborough V, and the mistakes made there have kept me occupied ever since. Qualitative study has lagged behind, and is only now getting on to a firm footing.

My summary of the coins from Richborough and analysis of the numbers involved was initially both naive and complicated, hardly unusual faults in a beginner. In retrospect, I think it is extremely important that the attempt was made to understand the coins in a numerical way and, even more important, that what was so obviously a preliminary essay was printed unchanged by a sympathetic editor. The steps towards understanding were quite simple; I grouped the coinage into short chronological periods of

about 20 years duration, expressed the number of coins found in each period as a percentage of the total coins found, and then tried to compare the coin loss at Richborough at different periods of time. Because coins lost at different dates were of different denominations and values, I tried to forge links of comparability between different denominations at different periods in order to compare the value of money lost at different periods, rather than comparing the crude number of coins found. If this is the desired end of any coin report then I can point to no obvious faults in the Richborough method, I know of no improvements that have been made to it, nor of any alternative methods, but two reasons have prevented me from ever applying it again in research on site finds.

The first objection to the method is that any final results are expressed in rather arbitrary units several steps removed by calculation and assumption from the raw coin numbers. This, of itself, is uncongenial to my methods, for I wish to know, at any moment, how any suggestion I may make relates to the physical data from which I started. More important is the discovery that different sites in similar areas of the Roman empire have closely comparable lists of coins, so much so that the major peaks and troughs of any histogram, expressed period by period, seem to relate to the general area in which the site is situated rather than the particular history of the individual site.

Up to and including the publication of Richborough V, Roman coins from any site had been expressed, at best, by diagrams showing the number of coins found per year, or per reign. Occasionally two diagrams might be compared and differences between them might be taken to be diagnostic of differences in the histories of the sites. The publication of Richborough, and the historical interpretation in which I indulged there, made me anxious to know how far my suggestions could be extended to other sites in England and abroad, and this led to a series of museum visits in the south of France (Reece, 1967), Italy (Reece, 1971), the north of France (Reece, 1972a), and a summary of coins from British excavations (Reece, 1972b). This last summary presented the findings from a series of sites on one diagram which demonstrated quite clearly that there was a British pattern of coin finds to which virtually all sites adhered. The inevitable deduction from this must be that direct historical interpretation of the numbers of coins from any site, period by period, refers not to that site, but to the process of coin supply to the area or province, since the pattern being explained is common to all sites in the province.

The next step was the establishment of a background for different areas of the empire and a method by which the vagaries of an individual site could be extricated from that background. The first description of that method was devoted to Richborough and the backgrounds of Britain (Reece, 1979). There remains much work to do on this subject, and I shall return to the problems which require attention in the last section of this paper. Meanwhile I can simply point out that I made two basic decisions; one decision was to proceed inductively, the second was to rely only on manual arithmetic.

The search for a British background, or backgrounds, involved a clear dilemma; I could either compare like with like, or I could let the numbers speak for themselves in determining what sites were alike. The deductive method would have been to prepare tables of villa coin lists, fort coin lists, town coin lists and so on, and compare each site

with a background made up only of other similar sites. I rejected this method for the simple and inescapable reason that what was being compared were coins, rather than plans, or topographical situations, and that no one had ever given any reason to assume that sites grouped together by ground plan would be similar in coin use, and vice versa. The obvious alternative was to commit my numerical information to the maw of a computer and allow a standard package to sort out groups of sites with similar coin use. This I again rejected for the reason already expressed above, that I have to be able to understand every mathematical expression I use in terms of hard physical material, and I have no faith at all in any mathematical manipulation which I do not fully understand. Neither decision proved fatal. Graphical presentation of only 14 sites in Britain (Reece, 1972b) had already shown that there seemed to be two rather different types of coin loss in Britain, and a further investigation on the same lines, this time of 88 sites bore out this twofold division (Reece, 1979). I therefore arrived at two backgrounds for Britain, the first which includes most, but not all, of the large towns, the second which seems to contain most, but not all, rural sites. I have since been able to show that, for instance, temples are not a well defined sub-group of the second class of rural sites which include forts, small towns, villas, temples and villages, and seem to have no characteristics of coin use which single them out in any way (Reece, 1980).

When Richborough was subjected to this research it could be seen as one of a class of rural British sites seen against the appropriate background. It was highly abnormal, but the abnormality came in the concentration of 45% of the total coins found in one period of 14 years (388–402) at the end of the Roman occupation, and this characteristic had been known and discussed well before such numerical methods were ever thought of. Where the method triumphed was that when the abnormal period was noted, but then made normal by the substitution of the background mean value for that period, the rest of the periods could be seen, uncontaminated by the final abnormality (Reece, 1979). The result was one of minimal deviation within the limits of one standard deviation of the background. This meant that there was no reason to look for any direct historical interpretation of the Richborough list, for there was no abnormality to explain. Within the minimal deviations the coins can be seen to be consistently low from about AD 70–260, high in the period 260–290, low around 370, and then astronomically high in the final period. These judgements, it must be noted, are not in absolute terms – that there are a lot of coins of the period 260–290 at Richborough – but in comparative terms. Given that there are a lot of coins of the period 260–290 on any site in Britain, there are even more than should be expected at Richborough compared with coins of other periods.

The problem of the final period at Richborough when some 20,000 coins were deposited remains unsolved, but I now feel reasonably sure of one possible explanation. In Richborough V I gave two possibilities; the favourite explanation at the time was that the great mass of coins came from a series of hoards whose existence had not been detected during excavation, the second possibility was that the number of coins represented true individual coin loss that was well outside the normal pattern. I think the balance of evidence is now in favour of the pattern of loss rather than of undetected hoards. In

Richborough V I gave some reasons for doubting the existence of so many, or such large hoards buried at random inside the fort, the main point being one of apparent similarity both in hoards and in hoarders. Now that we have the list of coins from recognised deposits (those in the lists followed by *) we can see that the coins found loose in the general clearance of the surface areas in 1926–28 are remarkably similar to the coins found in good 4th century pits, layers, and other contexts. One insistent similarity is to be found in the coins which can be dated within the year 383, minted between the accession of Arcadius on 19 January and the death of Gratian on 25 August. Most of these coins come from mints east of Italy and are uncommon as site finds in Britain; they occur, however, in both the stratified finds and the surface finds at Richborough and any theory which purports to explain one group must also be adapted to take into account the other.

Since the coinage in the fort at Richborough seems to be uniformly distributed so far as the coins of 388–402 are concerned it seems clear that the finds represent the general coinage in circulation at the period; the strangeness of Richborough perhaps being that all that coinage which was in circulation was deposited, whether accidentally or intentionally, and that is what was found. The coinage at Richborough at the end of the Roman administration therefore approximates to the coinage in circulation at that time and the only unusual feature is that the whole body of material was lost intact. On most other sites at most other periods a process of gradual loss, continued circulation, and monetary replacement cut down the coinage available to be lost at any time.

In the field of qualitative interpretation matters have moved rather more slowly. The suggestion in Richborough V that the coinage of Victorinus at Richborough formed a 'normal' sample of that emperor's coinage has only just been worked out in full, and, as a study of 'normality' of hoards and site finds is just about to be published (Reece, forthcoming a). This idea is now being taken up, and in the work of two dissertations at present in progress (Ross Millard and Andrew Hobley) on the coinage of Hadrian and Septimius Severus, we should shortly be able to see something of the distribution of different coin types in hoards and site finds in the north-western provinces. This will begin the process of using the individual coins at Richborough to plot the process of supply and coin movement within the administration. If results with individual types are good then the next obvious, but very time consuming, step would be to look at the actual dies from which the coins were struck for this could take us beyond a simple description of distribution as it remains at present to a first attempt at a picture of distribution from the mint which would carry with it the possibility of understanding the processes involved. Richborough is important here not because of its history as a Roman army base, nor because of the standard of excavations, but simply because it provides the largest group of coins in Britain from one source.

In the 4th century the differences of coin types are less informative than the mints at which the different coins were struck and the balance of supply from different mints at different sites. Two studies already carried out on the Richborough material have set out the sources of coin during the 4th century as judged by mint-marks, and the supply over

continuous small periods of time (Reece, 1978a). The importance of Richborough can again be emphasised since that work was done on two samples of coins in Britain of roughly equal size: the first comprised Richborough alone, the second included a summary of all the other major town sites in Britain whose coin lists were readily available. Now that those two samples have been gathered and carefully compared it is safe to say that Richborough gives the same information as a summary of easily available sites in Britain; this is mentioned to explain likely utility of the lists which follow, and to justify the printing of pages of severe and unattractive reference numbers.

There remain only two matters to deal with in this summary of Richborough material to date. Some categories of coin at Richborough remain unstudied in detail and these studies must be carried out before we come near to publishing a final and detailed catalogue of the total coin collection. The copies of coins of Claudius I have so far not been examined in detail, the large number of barbarous radiates remain uncatalogued, and the copies of the 4th century coinage other than the period 330–348, examined by Michael Hammerson, deserve close study.

Finally, work in progress needs to be reviewed. The central problem which remains is the method by which sites are to be compared both for the general information which might be gained from the concentration of certain types of coin use in certain areas of the empire, and from the particular type of coin use in a certain site. One attack on the numerical side of the problem is the empirical approach which N. J. Ryan hopes to develop by computer; he hopes to leave aside the groups and periods and phases which have been used so far in order to see if, from basic coin lists, groupings and clusterings of the individual coins will emerge. Further work on the distribution of mint products will certainly provide more information, but here we do depend on our colleagues abroad either for the publication of large numbers of site finds throughout the empire, or for facilities to examine these groups. Co-operation with the archaeological authorities of the city of Rome has already yielded very fruitful results, and it is hoped that one more year of work will produce for Rome a coin list similar to that from Richborough (Reece, forthcoming b). As an example of the information which can be gained, it is possible to cite the unusual mint-marks of the mint of Siscia around the year 370. The mark A/F/R over SISC is well known in Britain, and as usual Richborough provides a typical group of such coins (CK 1408–1417). The coins from Rome also have an unusual number of coins of that particular period from the same mint of Siscia, but none of that exact mint-mark occur; instead Rome has issues of a slightly different date which do not occur in Britain. This sheds a glimmer of light on the process of distribution of coin from the mints for it now seems likely that particular issues from a given mint may in fact go to one particular part of the empire for a particular reason. In fact if the mint-marks are seen as marks for batches of coin minted rather than the equivalent of date stamps then it may well be that batches of coin were minted for particular reasons and demands, and once we can establish that point considerable possibilities of interpretation open themselves out.

It is probably appropriate to end on a note of work still to be done. One of the problems which will complicate the understanding of formal coin supply will be the movement

of coins unofficially in the course of trade. I have already mentioned the coins from eastern mints belonging to the year 383 which occur in reasonable numbers at Richborough. It would be unreasonable to suppose that they reached the site by a special supply at a given moment from the eastern Mediterranean to Kent. This highlights the interesting and productive disagreement between myself (Reece, 1978b) and Michael Fulford, and is one of the points which may lead to a compromise solution. My stand is that all coin was sent out by the state in payment of state debts and with total unconcern for the convenience of coin users, the balances of payments between provinces, or the flows of trade. Fulford (1978) takes the opposite line suggesting that the bulk of coinage found on sites in the empire in the 4th century reached the spot at which it was lost by trade, and coinage therefore gives an indicator of both the directions and the volumes of trade at the time. The finds from Richborough and the finds from Rome both have a basic pattern of mint supply which seems to me to agree with my case; but both sites also have these small numbers, or moderate numbers of coins from mints which cannot by any rational process of administration have supplied the site, and these coins obviously favour Fulford's case rather than mine. A detailed examination of the Richborough sources when compared with Rome may well mean that a compromise is necessary in which there is bulk supply by the state, from the mint, to state servants in the provinces, but, when this coin has been delivered it is subject to fairly large scale movement by straightforward economic forces of supply, demand, and payment.

This is the danger of Richborough and its coins; it stretches out into all and any fields of research, and the study of it will probably continue so long as Roman archaeology survives.

Abstract

Most of the paper is devoted to a list of the 56,000 coins from Richborough which have been brought together in the form of modern references for the first time; it is hoped that they will now form a sound basis for future research. As an introduction a brief account is given of the work on the coins together with a short summary of research work that has been carried out to date with some of the main conclusions reached. Suggestions for further work are outlined, the main aim being a detailed catalogue of all the irregular issues together with adequate illustration.

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	forthcoming a	The normal hoard. *In* T. Hackens (ed.), *Numismatics and Statistics,* Council of Europe.
	forthcoming b	Coins in Rome; a preliminary report. *Opus,* i. Siena.

Summary catalogue

Abbreviations

obv. = obverse, rev. = reverse, indet. = indeterminate, var. = variant, mm. = mint-mark.

Reference works cited

CK = Carson, R. A. G., Hill, P. V. and Kent, J. P. C., 1960. *Late Roman Bronze Coinage,* part I. London: Spink and Co.
HK = The same – part II.
Mack = Mack, R. P., 1953. *The Coinage of Ancient Britain,* London: Spink.
RIC = Mattingly, H., Sydenham, E. A., Sutherland, C. H. V. and Carson, R. A. G., 1923 ff. *Roman Imperial Coinage,* London: Spink.
Sydenham = Sydenham, E. A., 1952. *Roman Republican Coinage.* London: Spink.

Conventions used

* after a number in the catalogue denotes coins from stratified or known deposits, thus: HK 56 (24*592) = 24 coins of this type were from recorded deposits, 592 have no information as to exact find spot.

VIRTVS legends on the coins are given in upper case letters as they actually appear.

RIC 123 the coin described fits exactly the description in the work of reference used.

as RIC 123 the coin is not fully legible but all that can be seen agrees with the description in the reference given.

copy of RIC 123 the coin is not a product of the central mint but has copied accurately the type cited.

copy as RIC 123 the coin is a copy rather than a regular product but all details necessary for a full identification cannot be seen. The nearest regular coin is of the type cited.

5	GREEK	Massilia bull (2), silver indet., bronze indet. (2).
3	BRITISH	Mack 203, Cunobelin otherwise indet., completely indet.
42	ROMAN REPUBLIC	Sydenham as 3/6/9, 514, 561c, 570a, as 635, 646, 687, 739, 740, 769a (2), 770, 773, 774, 809, 810, as 811, 885, 890, 905, 913b, 922, 976a, 985, 1006 (2), 1181, 1188, as 1216/46 (4), as 1243(2), 1323, indet. (7).

COINS STRUCK UNDER AUGUSTUS

15	Augustus	RIC 54, 67/84 (2), 180, 187, 221, 266, 305, 350 (4), 360 (3).
14	Tiberius	RIC (Augustus) 359/71 (3), 367, 368 (7), copy as 368, 370, 371.
7	Indeterminate	Dupondius, Asses (3 countermarked) (5), doubtful (2).

COINS STRUCK UNDER TIBERIUS

5	Divus Augustus	RIC (Divus Augustus) 3 (2), 6 (2), 8.
10	Tiberius	RIC 3 (8), 11, 15.
44	Agrippa	RIC (Tiberius) 32 (37), 32 countermarked (5), copies as 32 (2).
1	Indeterminate	As countermarked with bull's head.
33	CALIGULA	RIC 23/5, 27, 30 (14), 37, 40, 44 (5), 44/7 (2), 45, 47, '48' (2), 55 (2), Asses indet. (2).

COINS STRUCK UNDER CLAUDIUS I

329	Claudius I	RIC 60 (2), 60/1 (3), 62, 64 (8), copy as 64, 66 (8), copies as 66 (263), 67 (19), 68 (7), 69 (13), 72 (3), 74.
2	Nero	RIC (Claudius) 78 (2).
11	Antonia	RIC (Claudius) 82 (11).
3	Indeterminate	Asses (3).
106	NERO	RIC 28, 52/6, 73 (2), 159, 185 (2), 260, 280, 286/8 (2), 301 (2), as 301, 303 (2), 304 (5), 309, 315 (3), 317, 318, 319 (2), 322 (4), 329 (38), 338 (6), 342, 357, 361 (5), 363, 364 (3), Hybrid cf. p. 177, Asses indet. (7).
1	GALBA	Denarius indet.
1	OTHO	Denarius indet.
1	VITELLIUS	RIC 23.

COINS STRUCK UNDER VESPASIAN

159	Vespasian	RIC 5, 10 (4), 30, 36, 65, 67, 83, 90, 98a, 99a, 124a, 141, 278, 316, 427, as 428, 429, 443, 473, 475 (10), 478 (4), 479 (3), 482 (5), as 485 (2), 486 (3), 487 (2), 489, 494 (12), as 494, 496, 497 (5), as 497 (20), 500 (8), as 500, 502 (7), 520, 528 (9), 599, 739, 740, 742, 747 (2), 753 (3), 753b (11), 754 (5), 758, 763, 764a (8), 766 (2), 769.
10	Titus	RIC (Vespasian) 195, 205, 782b, 786 (5), 788, 789 (2).
13	Domitian	RIC (Vespasian) 241, 242, as 713, 719, 724 (5), 791a (3), Hybrid as 253.
28	Indeterminate	Otherwise illegible Sestertii (2), Dupondii (7), Asses (19).

COINS STRUCK UNDER TITUS

3	Titus	RIC 97, Sestertii reverses illegible (2).
1	Domitian	RIC (Titus) 50.
2	Divus Vespasian	RIC (Titus) 63, as 191.
100	DOMITIAN	RIC 23, 242a (4), as 242c, 247a, 272 (2), 279b, 293, 301b, 304b (3), as 305A, 325b (2), 327 (2), 328, 333 (10), 335 (16), 337, 339, 340 (2), 348, 349 (2), as 350 (3), 353a (2), 356a, 372, 388, 392, 395, 397, 401, 405, 408, 421, 424a, 435; Hybrid obv. as RIC (Titus) 36/rev. as RIC (Domit.) 173; reverses illegible: plated denarius (1), Sestertii (2), Dupondii (4), Asses (24).
12	NERVA	RIC 51 (2), 65, 93, 98 (3), 99, 133; reverses illegible Dupondii (2), As (1).

COINS STRUCK UNDER TRAJAN

67	Trajan	RIC 10, 12, 21, as 28, 38, 115, 116, 126, 180, 186, 315, 352, 357, 382, 385, 387, 392, 396, 414, 428, 434, 456, 459, 467, 500 (2), 502, 515, 519, 538, 560, 575, 586, 593, 613, 625, 626, 635, 663, 672, 676, 684, 702.
1	Marciana	RIC (Trajan) 749/50.

COINS STRUCK UNDER HADRIAN

58	Hadrian	RIC 39a, 41, 170a, as 227, 274c, 355, 551a (2), 563 (2), as 563 (2), 579c (2), 581a, 598a, 600c, 605, 612a, 631a, 634, 636 (2), as 665, 706a, 710a, 710f, 717c, 717f, 738, as 748a, 760, 785e, 788d, 790f, 812c, 820, 832, 833, 890.
8	Sabina	RIC (Hadrian) 391, 395a, 401a, 974, 981, 1035a, 1036, Denarius reverse illegible.

COINS STRUCK UNDER ANTONINUS PIUS

50	Antoninus Pius	RIC 26a, 49b, 61a, 62, 163, 175, 177, 224, 459a, 523a, as 528, as 534, 554, 598, 612, 620, 635a, 660a (2), as 668, 704a, 774 (2), 804, 816, 840 (2), 857, 871a, 894 (2), 906, 929, 930, 943a, 964, 993, 1002, 1016, 1035, 1206a; reverses illegible Denarii (2) Sestertii (2), Dupondii (4), As (1).
3	Marcus Aurelius	RIC (Ant. Pius) 1240a, 1268, 1355Bb.
17	Faustina I	RIC (Ant. Pius) 351, 362, 377, 378, 394a, 399a, 1108, as 1116, 1127, 1163a, 1163b, 1175, 1190, 1192Aa, As reverse illegible (3).
5	Faustina II	RIC (Ant. Pius) 1368, as 1375, 1378a, 1405 (2).

COINS STRUCK UNDER MARCUS AURELIUS

12	Marcus Aurelius	RIC 163a, 222, 425, 826, 929, 960, 965, 981, 992, as 1019, 1035, 1096.
4	Lucius Verus	RIC (M. Aurel.) 540, 898, 1300, 1355.
11	Faustina II	RIC (M. Aurel.) 688, 690, 706, 729, 1638, 1642 (2), 1647, 1667, 1688, 1696.
5	Lucilla	RIC (M. Aurel.) 772, 1755, 1767, 1773, 1779.
9	Indeterminate	Dupondii or Asses otherwise illegible (9).

COINS STRUCK UNDER COMMODUS

7	Commodus	RIC 209, 251, 375, 440, 460, 478, 561.
2	Crispina	RIC (Commodus) 276, 672.
2	Indeterminate	Dupondii or Asses otherwise illegible (2).

COINS STRUCK UNDER SEPTIMIUS SEVERUS

18	Septimius Severus	RIC 49, 88a, 125a, 190, 243, 265 (2), 266 (2), 288, 289, 308; Hybrids: as 321 (cf. p. 131), obv. as 150/rev. as 261, obv. as 176/rev. PON VII . . . .
6	Julia Domna	RIC (Sept. Sev.) 548, 572, 575, 581, 587, 640.
3	Indeterminate	Denarii otherwise illegible (3).

COINS STRUCK UNDER CARACALLA

6	Caracalla	RIC 4, 5, 30, 158, 178; hybrid obv. as RIC (Sept. Sev.) 176/rev. as RIC (Car.) 83.
1	Geta	RIC 103.
1	Julia Domna	RIC (Caracalla) as 373a.
2	Plautilla	RIC (Caracalla) 361, as 361.

COINS STRUCK UNDER ELAGABALUS

1	Elagabalus	RIC 87.
2	Julia Maesa	RIC (Elag.) 263, 271.
7	SEVERUS ALEXANDER	RIC 64, 127, 144, 173, 218, 235, As reverse illegible.
4	MAXIMINUS I	RIC 1, 60, Sestertii reverses illegible (2).
145	1st TO EARLY 3rd CENTURIES	1st century: denarius (1), bronze (17), countermarked bronze (4); 1st–2nd centuries: denarii (5), Sestertii (8), Dupondii or Asses (72), Semis (1), halved bronze (32); Late 2nd–early 3rd centuries: Denarii (10), Sestertii (2); 1st–3rd centuries: core of plated denarius (1), bronze (1).
1	GORDAN III	RIC 95.
I	PHILIP I	Hybrid: obv. IMP M IVL PHILIPPVS AVG/rev. VIRTVS AVG. (note p. 100).
2	TRAJAN DECIUS	RIC 21b, as 120.
1	TREBONIANUS GALLUS	RIC 80.
3	VOLUSIAN	RIC 187 (2), radiate reverse illegible.

COINS STRUCK UNDER GALLIENUS AND VALERIAN I (253–9)

4	Valerian I	RIC 92, 209, 261, radiate reverse illegible.
6	Gallienus	RIC 10, 56, 134, 178, 332 (2).
1	Saloninus	RIC 10.
4	Valerian II	RIC 9 (2), 24 (2).
1	Salonina	RIC 5.

COINS STRUCK UNDER GALLIENUS (259–68)

500	Gallienus	RIC Rome 153, 157 (17), as 157, 159 (6), as 159, 160 (13), 162, 163 (14), 164 (9), 165, 166 (3), 167, 168, 176 (8), as 176 (3), 177 (7), 178 (7), as 178 (2), 179 (25), 180 (12), 181 (14), 182, 184, 192a (3), as 192a, 193 (11), as 193, 197, 205, 206, 207 (6), 208 (2), 210 (3), 213 (2), 214 (6), 216, as 216, as 219, 221 (5), 222, 226 (3), 230 (6), 232, 233 (5), as 233 (2), 236 (26), 242, 245 (14), as 245, 246, 248, 249 (7), 251, 253 (3), 255, 256 (21), as 256 (2), 259 (2), 260 (2), 267 (6), 270, 274a (4), 275 (2), 277, as 277 (2), 280 (12), as 280, 282 (2), 283 (2), 284, 286, 287 (4), 288, 297 (3), 299 (3), 300, 301, 317, 325, 329, 330 (5), 336, 339; Mediolanum 453, 470, 471, 480 (2), 481, 484, 485, 487, 494 (5), 495, 506, 508a, 511a; Siscia 556, 565, 572 (9), 574, 575 (2), 580, 584, 585 (21), 586, 589, 670; otherwise illegible (68).
27	Salonina	RIC Rome 2, 5 (4), 5a, 11 (3), 12 (4), 13, 16, 25, 27, 32, 56; Siscia 62, 67, 69, reverse ANNONA AVG; otherwise illegible (4).

1385	CLAUDIUS II	RIC Rome (dated) 10, 11, 10/11, 12 (5), (undated) 13 (2), 14 (17), as 14, 15 (16), 16 (3), 17, 18 (5), 18/19 (2), 19, 22, 24 (2), 31 (2), 32 (16), 34 (16), 35, 36 (10), 38 (4), as 40 (2), 45 (3), as 45 (10), 46 (6), 48 (13), 48/49 (5), 49 (5), 52 (5), 53 (2), 54 (24), 55 (3), 56 (4), 57 (4), as 57, 61 (10) 62 (8), 63, 65 (3), 66 (8), 67 (2), 68 (4), 71, 72 (2), 79 (13), 80 (16), 81 (5), 85 (3), 86 (10), 89 (3), 90 (2), 91 (4), 91/92 (3), 92, 98 (15), 98/99 (8), 99, 100 (6), 102, 103 (2), 104 (14), 105 (9), 106 (2), 107 (2), 109 (30), 110, 111 (3), 113 (3); Mediolanum 137, 139 (4), 145 (5), 149 (6), 153, 156, 157, 161, 162 (6), 163 (3), 168 (6), 171 (4); Siscia 180, 181 (7), 186, 187 (3), 191 (3), 192, 195; Antioch 197, 223 (7); Commemorative 257, 259 (4), as 259 (2), as 261 (367), as 266 (226), 285, 287 (2), 289, 290; reverses otherwise illegible (324).
24	QUINTILLUS	RIC 6 (2), 9, as 13, 18 (8), 19, 20, 21, 22, 29 (2), 31 (2), 33 (2), 35, 45, 49, 58, reverses illegible (2).
20	AURELIAN	RIC 41, 56, 59, 60 (2), 120 (2), 128, 129, 135, 143, 144, 154, 184, 202, 260, reverses illegible (4).
1	SEVERINA	RIC 9.
25	TACITUS	RIC 14, 27, 30, 48, 61 (2), 65 (6), 67, 84 (2), 92 (2), 94, 140, 152 (3), 165, reverses illegible (2).
1	FLORIAN	RIC 110.
28	PROBUS	RIC 17, 29 (2), 38 (2), 44, 65 (3), 80, 85, 91 (4), 93, 112, 170, 215, 435, 516, 673, reverses illegible (6).
1	CARUS	RIC 29.
3	CARINUS	RIC 295, 330, reverse illegible.
6	DIOCLETIAN	RIC 5 (pre-reform) 34 (2), 47 (2), 162, 169.
5	MAXIMIAN HERC.	RIC 5 (pre-reform) 365, 371, 397, 407, reverse illegible.
65	POSTUMUS	RIC 54 (4), 55, 58, as 60, 67, 73 (4), 76 (2), 77, 80, 83 (2), 87, 89 (3), 90, 93 (2), 113, 123, 134, 143, 144, 204, 239, 287 (2), 289, 309 (2), 315, 316 (3), 317 (2), 318 (7), 328 (2), 329, 373 (3), 389, reverses illegible (8).
1	LAELIAN	RIC 9.
6	MARIUS	RIC 6, 10 (2), 17 (2), reverse illegible.
479	VICTORINUS	RIC 40, 41 (2), 46, 51 (4), as 51, 55 (9), 56, 57 (25), 59 (2), 60, 61 (47), 67 (21), 71 (60), 73 (6), 75 (10), 78 (37), 106, 110 (8), 113 (2), 114 (53), 115 (8), 117 (2), 118 (74), 123, 126, rev. ABVNDANTIA AVG, reverses illegible (100).
1152	TETRICUS I	RIC 47, 52, 54 (2), 56 (30), as 56 (4), 57 (5), 59, 61, 66 (3), as 68 (21), 70 (3), 71 (9), as 79 (33), 80 (26), 82, as 82 (3), as 86 (99), 87 (13), as 87 (44), 88 (7), 89, 90 (24), 94 (3), 98 (6), 100 (35), as 100 (182), 101 (12), 102, 106 (2), 109, 110 (8), as 110, 121 (4), as 121 (52), 130 (5), as 130 (36) 132 (12), 134, 136 (49), 138 (2), 141 (33), 145 (27), 146 (3), 147 (10), 148 (31), reverses illegible (258).
377	TETRICUS II	RIC 223, 224 (9), 229, 234, 235 (2), 238 (3), 238A, 247, 248 (20), as 248, 254 (36), 258 (6), 259 (10), 260 (10), 267 (5), 270 (66), as 270 (56), 271 (5), 272 (37), as 272 (42), 273, 274 (5), 278, 280, reverses illegible (56).
1173	CARAUSIUS	RIC (with mint-marks) AD 286–9: 10 (2), 12 var., 15 var., 41, 50, 58 (6), 58 var. (2), 57/59, 60, 62, 64, 65, 69 (5), 69/70, 74/75, 75, 75 var., 98, 101 (29), 101 var. (4), 101/108, 108 (2), 112 var., 119, 121 (2), 123, 125, 160, 178, 181, 193, 258, 261, 283, 287, 288, 303 (2), 305 (2), 322 (2), 331, 348 (3), 385, 398, 615 var., 620. AD 290–1: 13, 98 (4), 101 (4), 118, 121 (3), 123, 128, 149

		(2), 155 (2), 165, 300, 346 (2), 467 var., 475 (13), 476 (2), 478 (6), 479, 482 var., 484 (5), 487, 498 var., 514 (2), 529. AD 292–3: 98 (2), 118 (3), 161 var., 180, 300 (6), 347 var., 373, 420. AD 293: 98 (6), 118 (2), 122 var. Possible copies: 155 (2, one an overstrike), 237, 300, 300 var., 320 var. overstruck. (Without mint-marks) AD 286–91: 736 (3), 744, 750 (3), 759, 783 (4), 784 (2), 790, 803 (2), 816, 823 (2), 824 (4), 843 (4), 844, 847, 855 (7), 856, 857 (2), 869 (3), 880 (3), 881 (5), 883 (8), 888, 890 (3), 895 (19), 897 (2), 898 (2), 909 (2), 917, 920, 927 (3), 929 (2), 952 (2), 983 (16), 984 (3), 985 (2), 999, 1006, 1007, 1015 (2), 1020 (3), 1038 (6), 1040, 1041 (2), 1047, 1052. AD 291–3: 755, 854 (2), 859 var., 878 (2), 885 (2), 893 (2), 899, 982 (2), 992, 1042. AD 286–93: 735, 780 (2), 826. (Unusual issues) reverses in AVGGG, AD 291: 494 var., 495, 510. AD 292–3: 43, 141, 145 (7), 335 (2), 336, 366 var., BRI mint-mark cf. 1087 (2); RSR mint-mark denarii 560, 620; Rouen mint 682 (2), 684; possible Rouen mint TVTELA AVG. Struck for Diocletian: RIC 5 (2), rev. CONCORD MILITVM (1). Struck for Maximian: RIC 34 (2), 35, 36, 42, 46. Struck for Diocletian or Maximian rev. PAX AVGGG. Obverse brockage (1). Obverses uncertain reverses from PAX AVG (vertical sceptre) (310), (transverse sceptre) (40), (sceptre uncertain) (37), ADVENTVS (3), CONCORDIA (3), COMES (4), FIDES MILITVM (6), FORTVNA (7), HILARITAS, IOVI, Legionary (3), LAETITIA (14), MONETA (10), ORIENS (2), PROVIDENT (11), PIETAS (6), SALVS (24), SPES (2), SECVRITAS, TVTELA, TEMPORVM FEL, VICTORIA (5), VIRTVS (10), reverses completely uncertain (262).
260	ALLECTUS	RIC (by mint-marks) AD 293–5: 17, 20, 22 (17), 25 (2), as 26, 28 (17), 33 (22), 34 (2), 36 (3), 38, 47, 48 (2), 69 (3), 79 (3), 83, 86 (8), 91 (4), 97, 102, 105, 108 (6), 111 (4), 117 (2); reverses from LAETITIA, PAX (vertical sceptre) (6), (transverse sceptre) (5), (sceptre uncertain) (2), PROVID (3), PROVIDENTIA, VIRTVS, FIDES, reverses illegible (13). AD 295–6: 55 (41), 124 (10), 125, 126 (4), 128 (25), 130 (3), reverses from Galley, LAETITIA, VIRTVS (7), reverses illegible (29).
2741	3rd CENTURY	Late denarius otherwise illegible (1), barbarous bronze but not radiate (1), Regular Radiates otherwise illegible (773), Barbarous Radiates (1966).

COINS STRUCK FROM 294 to 317

104	RIC 6 London	6(a) (2), as 6(a), 15 (3), 22, 30 var., 33, 37(b), 42 (1*1), 48, 58(a), 58(b), 85 (4), 87, 108, 110, 114, 121(a) (48), 122 (8), as 124, 133, 153 (2), 195 (1*1), 209(b) (1*5), 209(a), 222(a), 231, 234, 240, 249 (1*1), 250, 279, 280 (2), 282 (2).
37	RIC 7 London	3 (2), 8, 10 (1*8), 13 (2), 17 (2), 30, 30 var., as 30, 35, 43, 50, 52, 53, 60, 88, 89, 91, 92 (3), 94, 107 (2), 109, 111 (2).
69	RIC 6 Trier	102(a), 163, 188(a), 213(a), 213(b), 277(a), 358(a), 428, 486, 518(a), 572, 582(a) (2), 594(a) (1*), 594(b) (3), as 718, 730 (2), 768 (2), 770, 845(b) (2), 859, 863, 866(a) (7), 870 (7), 874 (4), 876, 890 (2), 892, 893, 897 (5), 898 (3*6), 899 (4*1).
39	RIC 7 Trier	56 (5), as 97, 121 (1*9), 131, 132 (2), 135 (17), 159, 161, 163.
14	RIC 6 Lyon	43, 54(a), 164(a), 231, 253, 300, 307 (2), 308, 310 (5).

11	RIC 7 Lyon	2, 4, 5 (1*3), 15 (2), 17, 20, 33.
9	RIC 6 Ticinum	45(a), 45(b) (3), 55(b), 60(a), 72, 97, as 100 (1*).
1	RIC 6 Rome	As 82 (1*).
1	RIC 6 Arles	72.
8	RIC 7 Arles	72, 74, 75 (3), 77, 92, as 92 (1*).
1	RIC 7 Ostia	83.
1	RIC 6 Carthage	37(b).
61	Uncertain and partly illegible: Incuses of obverse; Constantine I (1), Crispus (1). Reverses from CLARITAS REIPVBLICAE (2), GENIO POP ROM (2*9), MARTI PATRI PROPVGNATORI (1), SACRA MONETA (1), SOLI INVICTO COMITI (17). Otherwise illegible (27).	

COINS STRUCK FROM 317 to 330

116	RIC 7 London	140, 144, 145, 154 (4*8), as 154, 155 (1*), 155 var., as 157, 157 (3*2), 158 (1*2), 158 var., 161 (3*2), 168 (2*2), 169, 170 (2), 171, 174, 180, 182, 185 (2*1), 190 (1*), 196, 205, 211, as 211 (1*), 219, 225 (1*4), 229, 230 (2), 233, 236, 250 (1*2), as 252(a), 255 (2), 264 (2), 267 (1*), as 267, 274, 275, 284 (1*), 286, 287 (1*4), 289 (5), 291 (5*4), 292 (1*6), 293 (1*2), 295 (1*), 296 (1*3), 298 (1*), 299 (1*1), as 299, 300.
335	RIC 7 Trier	204, 205, 208(a) (3), as 208, 209 (2*1), 209(a) (2), 210 (2), 213 (20*16), as 213, 216 (7), 218, as 227 (1*), 230, 232 (2), 252, 254, 255 (2), as 256, 258 (2), 264, 266 (2*2), 267, 269, 275 (1*), 276, 291 (1*), 300, 303 (4*16), as 303 (3), 303 var. (2), 305 (6*8), as 305, 306 (2*2), 308 (3), 309 var., 312 (1*2), 315, 316 (2*12), as 316, 318 (2*3), as 337, 341 (4*13), 342, 347 (4), 348 (1*1), 351 var., as 351(a), 353, as 353, 368 (5*18), 369 (2*7), 371 (3*), as 371, 372 (1*2), 376, 382 (1*3), 384(a), 386, 389 (7), 390 (2), 392 (2*), 399 (3), 402, 405, 410, 429 (3), as 429, 431 (2*3), 433 (12), 435 (8), 439 var., 440p (1*1), 440s (1*2), 441 (6), 449 (4*2), as 449 (2), 451, 454 (2), 455, 456 (1*1), 458 (1*2), 461 (2*1), 462 (4), 463 (2), 464, as p. 206 (1*), 465 (2*), 466, 475 (1*), 483 (1*), 484 (1*), 489 (1*4), 504 (7), 506, 507, 508 (1*).
30	RIC 7 Lyon	65 (2*), 49, 83, 107, as 107(a), 115, 126 (1*), 131, 132 (3), 132 var., 143, 148, 188, 189, 198 (1*1), 199 (1*1), 202, 214 (1*3), 217, 220, 225. Irregular: Crispus, reverse BEATA TRANQVILLITAS, mm. C/R/PLG.
19	RIC 7 Arles	191, 216, 219 (2), 220, 228 (2*), 230, 233 (1*1), 241, 242, 252 (2), 253 (1*), 263, 291 (1*), 321, 334 (1*).
4	RIC 7 Aquileia	48, as 86(a), 85, 108.
1	RIC 7 Constantinople	11.
4	RIC 7 Cyzicus	15 (2), 18 (2).
8	RIC 7 Nicomedia	44 (1*3), 49, 90, as 93, 121.
4	RIC 7 Siscia	159 (1*), 181, 182 (2).
4	RIC 7 Thessalonika	101 (1*), 107, 125, Hybrid obv. CONSTANTIVS AVG/rev. CAESARVM NOSTRORVM, not obviously barbarous.
9	RIC 7 Ticinum	90 (3*), 94, 170, 174 (2), as 174, 203.
3	RIC 7 Rome	195 (a), 238, as 282.
75	Uncertain and partly illegible: reverses from BEATA TRANQVILLITAS (8*18), CAESARVM NOSTRORVM Crispus (2), indeterminate (1*), D N CONSTANTINI MAX AVG (6*3), PROVIDENTIAE AVGG/CAESS (1*5), VICTORIAE LAETAE PRINC PERP as p.224 Appendix (1), Constantine I mm. TR probably irregular (1), Constantine I (1*15), Crispus (1*), Indeterminate (6*3), VIRTVS EXERCIT (2*1).	

COINS STRUCK FROM 330 to 348

1712	HK Trier	48 (1*15) as 48 (6), 49 (1*15), as 49 (7), 50 (6), as 50, 51 (5*33), 52 (1*65), 54 (4), 55 (1*5), 56 (25), as 56 (4), 56 var. (2), 57 (1*1), 58 (3*42), 59 (4*18), 61 (1*5), as 61 (5), 62 (1*16), 63 (1*22), 63 var., 64 (8), 65 (5*45), 66 (2*44), 67(a) (2), 68 (1*6), 69, 70 (13), 71 (2*10), 72 (5), as 72 (7), 73 (2*11), as 73, 74 (1*2), 76 (3*15), as 76 (2), 77 (2*19), 80, as 80 (2), 81 (2), as 81, 83, 85 (12), 86 (9), 87 (6), as 87 (2), 88 (5*7), as 88 (32), 89 (1*7), as 89 (6), 90 (4), as 91 (1*2), 92 (2), 93 (36), as 93 (2*20), 94 (9), as 94, 95 (7), 96, 104 (2), 106 (2), 107 (3), 108 (3*24), 108(a) (8), 110, 112 (27), 113 (3*40), 114 (1*10), 115 (1*3), 116 (5*7), 117 (3), 118 (1*12), 119 (4*48), 120 (3*44), 120 var., 120 var., 124 (2*6), 126 (1*31), as 126 (1*7), 127 (12), 128 (20), 129 (19), 130 (1*4), as 130 (2), 131 (3*10), 132 (2*23), as 132 (1*9), 133 (4*47), 135 (2), 136 (4), 137 (2*2), as 137 (3), 138 (5*11), as 138 (3), 139 (3*1), 140 (38*65), 140 (2*3), 141 (2*3), 142 (5*10), 142(b) (1*3), 143 (2*1), 144 (4), 145 (3*9), 146 (1*2), 148 (34*60), 149 (8*4), 150 (16*29), 152 (3), 154 (7*11), 155 (12*13), 156, 157 (2*1), 158 (10*28), 159 (9*15), 160 (26*27), 161 (4), 162 (2), 163 (9*4), 164 (3*15).
429	HK Lyon	180 (7), as 180 (4), 181 (1*27), 181 var., as 180 (2), 182 (8), 184 (42), 185 (2*28), 186 (4), as 186, 187 (2*12), 188 (2), 190 (1*15), 191 (1*16), 192, as 192, 193 (1*4), as 193, 194 (2), 195 (1*6), 196 (1*), 198 (10), 199, 200 (1*21), 201 (9), 202, as 202, 203 (1*4), 204 (2), 205 (2*3), 213, 217, 221, 222 (3), 222(a) (9), 223, as 223, 226 (1*1), as 226 (2), 227 (3), 228, as 228, 229 (1*1), 230 (5), 231, 232 (2), 233 (2), 234 (1*1), 237 (1*1), 238 (1*8), 238(a) (2), 239 (15), as 239, 240 (1*), as 240 (1*3), 241 (1*12), 242 (1*5), 243 (9), 245 (2), 247 (5), as 247 (2), 250 (7), as 250, 251 (7), as 251, 251(a) (9), 258 (2*), 259 (1*1), 260 (2*7), 261 (3*), 262 (2*4), 266 (2*4), 267 (1*2), 273, 274 (1*8), 274 (a).
243	HK Arles	352 (10), as 352 (2), 353 (3), 354 (2), as 354 (2), 355 (2), as 355 (1*3), 356, as 356 (2*5), 361, 367 (1*6), as 367, 368 (3), 369 (2), as 369, 370 (4), 371, 371 var., 373 (3), 374 (4), as 374 (2), 375 (2), 376 (7), 377, 378 (1*5), 379 (1*3), 380 (1*), 381, 382 (5), 383 (1*1), 386, 389, 390, 393 (3), 398 (3), as 398 (2), 399 (1*2), 400 (1*3), as 400 (3), 401 (1*2), 402, 402(a), 412, 416 (3), 421 (4), as 421 (4), 425 (2), as 425, 435, 440 (2), 441 (1*6), as 441, 442 (7), 443 (1*3), 444, 446 (1*2), 448 (2*1), 449 (3*6), 455 (7*13), 456 (11*20), 457 (3*11), 458 (1*1), 460 (3*2).
45	HK Rome	531 (2), 532, 539, 546 (1*1), 547 (1*), 549 (2), 553 (1*), 557, 569 (1*2), 570, 571, 573, 581, 585 (2), as 585 (1*2), 587 (7), as 587 (5), 592, 596, 599, 602, 615, 620, 638 (3*1).
11	HK Aquileia	650, 655 (2), 671, 673, 681 (3), 692(i), 700, 702.
38	HK Siscia	742 (2), as 742, 743 (1*3), 744 (3), 745 (1*2), 746 (2), 747, as 747, 748, 749 (1*1), 750 (2), 751 (2), 755 (2), 756, 769, 772, 774 (2), 780 (1*2), 781, 783, 788(a) (2).
6	HK Thessalonica	835, 836 (2), 837(a), 848, 860.
3	HK Heraclea	946, 943, 934.
65	HK Constantinople	1009 (2), 1047, 1064 (3), 1065 (1*2), 1066 (3*23), 1067 (3*27).
2	HK Nicomedia	1116, 1121.
6	HK Cyzicus	1223, 1228, 1231, 1261, 1263, 1283.
1	HK Alexandria	1454.
6	HK Antioch	1384, 1397 (2), 1398 (3).
4	Brockages	Constantine I (copy) obverse, Constantius II Aug obverse, Theodora obverse, PAX PVBLICA reverse.

100	Hybrids	Helena/GLORIA EXERCITVS 1 St. (1), VRBS ROMA/CONSTANTINOPOLIS (11*70), CONSTANTINOPOLIS/GLORIA EXERCITVS 1 St. (2*13), CONSTANTINOPOLIS/PAX PVBLICA (1), CONSTANTINOPOLIS/Star in wreath (1), VRBS ROMA/GLORIA EXERCITVS 1 St. (1).

Uncertain and partly illegible

1888	Larger than 15 mm diameter and therefore probably regular, reverses from:	CONSTANTINOPOLIS (6*100), GLORIA EXERCITVS 2 St. (13*129), GLORIA EXERCITVS 1 St. (53*615), PAX PVBLICA (8*110), PIETAS ROMANA (2*83), VRBS ROMA (2*75), VICTORIAE DD AVGGQ NN (170*465), VOT XX MVLT XXX (3*21), Quadriga (12*21).
4482	Smaller than 15 mm diameter and therefore probably irregular, reverses from:	CONSTANTINOPOLIS (94*1409), GLORIA EXERCITVS 2 St. (56*712), GLORIA EXERCITVS 1 St. (33*1007), PAX PVBLICA (4*19), PIETAS ROMANA (2*43), VRBS ROMA (63*1027), VIRTVS AVG (1*12).

COINS STRUCK FROM 348 to 364

21	CK Amiens	2, 3 (1*2), 5 (3), as 8 (3), 9, as 9, 13, 18 (2), 19, as 19 (3*1), 20.
208	CK Trier	29 (2), 30, 30(a) (3), 32 (10), 33 (27*33), 34 (5*2), 35 (24*13), 36, 37 (2*), 39 (2*1), 40 (1*5), 41 (1*3), 46 (1*1), 47, 48, as 49, 50 (5*2), 51 (3), 53, 55 (1*1), 56 (3), 57, as 57, 58 (10), as 58 (4), 59 (3*), 60 (3), 62 (1*2), 63 (2), 66 (2), 67, 72 (1*15), as 77 (1*3), as 87.
51	CK Lyon	178 (3), 185, 193 (1*2), 194 (2*), var. (1*2), 201, 208 (2), 211 (1*4), 213 (2*), 215 (2), 218, 221, 226 (1*), 235 (2), 237, 252 (5), 253 (2), 254 (1*7), 265, 270 (2), as 270 (2), 272.
16	CK Arles	404, as 415, 455 (1*3), 456 (1*), 457 (1*2), 460 (3), 461, 464 (2).
15	CK Rome	603, 604 (3), 636, 662 (2*), 680, 687 (3), as 689 (4).
7	CK Aquileia	884 (2), 890, 918, 922, 930, 935 (1*).
5	CK Siscia	1121, 1216 (2), 1218 (2).
2	CK Thessalonica	1683, 1688.
4	CK Constantinople	2039 (2), 2055 (2).
6	CK Cyzicus	2490, 2496, 2504 (2), 2505, 2507.
2	CK Nicomedia	2295, 2309.
1	Gold	Obv. IM CAE MAGNENTIVS AVG, Rev. VICTORIA AVG . . . ROMANOR, mm. TR.
4	Silver	Reverses from: VICTORIA AVGGG (1), VIRTVS AVGVSTI (1), VOTIS V MVLTIS X (1), VOT XX MVLT XXX (1).
394	Bronze: Reverses regular	but coins otherwise partly illegible: FELICITAS REIPVBLICE (2*2), FEL TEMP REPARATIO Fallen horseman (14*108), Galley (3*7), Hut (2*4), Phoenix on globe (6*14), Phoenix on pyre (6*22), SALVS DD NN AVG ET CAES (1*4), SPES REIPVBLICAE (13*128), VICTORIAE DD NN AVG ET CAES (3*37), reverse illegible (5*13).
1742	Bronze: Reverses irregular	but coins otherwise partly illegible: FELICITAS REIPVBLICE (5*5), FEL TEMP REPARATIO Fallen horseman (191*1309) (of which one is overstruck on Gloria Exercitus, and two have obverses of Carausius II), Galley (4), VICTORIAE DD NN AVG ET CAES (11*130), reverses illegible (41*48).

COINS STRUCK FROM 364 to 378

38	CK Trier	82 (6), 83 (2), 85, 94, 95, 96 (1*1), 97 (7) (4), 98 (1*), 100, 104, 105, 107 (2), 108, 109, 113, 118 (2), 121(a), 124, 125.

353	CK Lyon	273, 275, 276 (4), 277 (1*3), 278 (3), 279, 281 (2), 282 (2), 287 (4), 289 (3), 290, 292, 297, 300 (16), 302 (3), 303 (1*10), 304 (1*1), 307 (1*6), 309 (7), 310, 311 (1*1), 313, 315 (5), 317 (1*18), 318 (1*2), 319 (2*19), 320 (2), 321 (3), 322 (4), 323, 324, 330 (6), 331 (1*13), 332 (1*7), 333 (2*2), 335 (4), 336 (5), 337 (3), 338 (5), 339 (6), 340 (21), 341 (1*5), 342, 343 (11), 344 (8), 345 (4), 348 (1*), 350 (6), 351 (8), 352 (1*5), 353 (3), 356, 358, 360 (3), 363 (1*3), 364 (1*9), 365 (1*3), 366, 367 (1*5), 368 (5), as 368. mms. partly illegible: GLORIA ROMANORVM Valentinian I (19), Gratian (9), illegible (6); SECVRITAS REIPVBLICAE Valens (1*11), Gratian (5).
720	CK Arles	477 (2), 478 (1*), 479 (1*19), as 479, 480 (1*8), 481 (2*3), as 481 (3*), 482, 483 (2*26), 487 (3), 490 (2), 492 (4), 493 (3), 494 (1*), 496, 497 (3), 499 (3), 501 (11*), 502 (8), 504, 506, 507 (1*2), 508 (5), 510 (7), 511 (1*14), 512 (8), 513 (14), 514 (20), as 514, 515, 516 (1*26), 517 (8), 518 (3), 519, 520 (3), 521 (3), 523 (8), 523(a) (1*5), 525 (1*25), 526 (6*27), 527 (2*55), 528 (3*102), 529 (3*117), 533 (6*17), 535 (3), 536 (3), 537, 538, 540 (2), 541, 542 (2), 543 (3). mms. partly illegible: GLORIA ROMANORVM Valentinian I (7), Valens (2), illegible (4); SECVRITAS REIPVBLICAE Valentinian I (1*3), Valens (17), illegible (10); GLORIA NOVI SAECVLI Gratian (2*50).
76	CK Rome	710 (2), 711 (2), 712 (8), 713 (2*22), 714 (1*2), 715 (3) 716, 722, 724 (5), 725 (21), 726 (6).
174	CK Aquileia	965 (2), 966 (3), 967 (1*1), 968 (2), 970 (1*6), 971 (2), 972 (4), 974, 976, 985, 986 (4), 987, 991 (2), 996, 999 (3), 1007, 1009 (2), 1011 (1*17), 1012 (4*24), 1013 (3), 1014 (14), 1015 (36*), 1016 (5), 1017 (4), 1018 (3), 1020, 1021 (3), 1022, 1026 (1*), 1028, 1029, 1030 (3), 1031 (1*5), 1035, 1036 (5), 1037 (1*).
104	CK Siscia	1299, 1305 (1*), 1308, 1326, 1327, 1330, 1334 (1*1), 1342, 1344, 1348 (1*1), 1350, 1352, 1364 (2), 1390 (2), 1391, 1393 (5), 1394 (2), 1395 (4), 1396 (9), 1397 (4), 1398 (3), 1400, 1401 (8), 1402 (4), 1403, 1404 (5), 1405 (8), 1406 (5), 1407 (3), 1408 (1*3), 1409 (2), 1413 (4), 1414, 1415, 1416 (5), 1417. mms. partly illegible: GLORIA ROMANORVM Valentinian I (2), Gratian (1); SECVRITAS REIPVBLICAE Valentinian I (1), Valens (1).
3	CK Thessalonica	1724, 1740, 1750.
1	CK Heraclea	1935 (1*).
1	CK Nicomedia	2323 (1*).
2	CK Cyzicus	2538, 2529.
1	CK Antioch	2654.
62	Silver	Reverses: RESTITVTOR REIP (1*5), VRBS ROMA (7*19), VOTIS V MVLTIS X (3), VOT V MVLT X (4), VOT X MVLT XX (6), illegible (8*9).
1185	Bronze	Otherwise illegible: RESTITVTOR REIP (1*3), GLORIA ROMANORVM (20*339), SECVRITAS REIPVBLICAE (22*800).

COINS STRUCK FROM 378 to 388

41	CK Trier	133 (1*), 149 (4), 150, 156 (7*20), 158 (8).
99	CK Lyon	370, 372 (6), 376, 377 (33), 379, 380 (2), 385, 386 (2*2), 387 (7*26), 388 (1*16).
148	CK Arles	545 (2), 547 (2), 548 (2), 550 (2), 552 (1*18), 554, 559 (4), 560 (33*68), 561 (15).

109	CK Rome	753, 763 (1*1), 765 (2), 766, 780 (2), 781 (1*3), 782, as 782 (1*), 783 (2), 785 (1*8), as 785 (4*11), 787 (3*11), 788 (3), 789 (2*8), as 789 (2*7), 790 (1*17), 794 (2), 795 (1*12).
56	CK Aquileia	1065, 1073 (3), 1077 (2), as 1087, 1091 (9), as 1092, 1092 (2*6), 1095 (3), 1101, 1103 (4*13), 1104 (2*8).
5	CK Siscia	1519, 1539, 1541, 1542, 1546.
5	CK Heraclea	1957 (2), 1964 (3).
1	CK Constantinople	2159.
24	CK Nicomedia	2378, 2379, 2381 (3*5), 2382 (13), 2385.
34	CK Cyzicus	2533, 2552 (4), 2556 (3), 2557 (16), 2558 (2), 2561, 2562 (7).
12	CK Antioch	2685, 2730, 2734 (2), 2736, 2741 (6), 2743.
1	CK Alexandria	2881.
3	Silver	Flavius Victor VIRTVS ROMANORVM (3).
774	Bronze	mms. illegible: CONCORDIA AVGGG Theodosius (2), illegible (1*3), REPARATIO REIPVB Gratian (6), Maximus (4), Theodosius I (1), Valentinian II (1); SPES ROMANORVM Eugenius (1), Maximus (17*85), Victor (2*39), illegible (4*56); VICTORIA AVGGG two victories Arcadius (2*27), Theodosius (12), Valentinian II (2*12), illegible (11*324); VOT V Arcadius (4), illegible (1); VOT V MVLT X Gratian (1), Theodosius (3), illegible (1*); VOT X MVLT XX Gratian (1*2), Theodosius (18), Valentinian II (4), illegible (1*9); VOT XV MVLT XX Gratian (40), Theodosius (1*2), Valentinian II (1), illegible (1*22); VOT XX MVLT XXX Gratian (5), Valentinian II (4), illegible (4); VOTA illegible Gratian (2*3), Theodosius (5), illegible (1*24).

COINS STRUCK FROM 383 to 402

1	CK Rome	802.
2	CK Aquileia	1108 (1*1).
3	CK Siscia	1575, 1576 (2).
4	CK Thessalonica	1859, 1860, 1864, 1865.
2	CK Nicomedia	2390 (1*1).
11	Bronze	mms. illegible SPES ROMANORVM (6*5).

COINS STRUCK FROM 388 to 402

Reverses VICTORIA AVGGG

183	CK Trier	161, 164, 165 (6), 166 (23), 167 (7*107), 171 (1*8), 174 (1*7), Trier mint but obv. illegible (3*18).
420	CK Lyon	389 (4*69), 391 (2*46), 392 (11*228), 393 (4*2), 396 (1*14), 397 (3), mm. V/LVGP obv. illegible (5), LVGP obv. illegible (2*29).
897	CK Arles	562 (12*143), 565 (15*126), 566 (21*494), 567 (3), 570 (6*25), mm. PCON (9*43).
11007	Mint illegible	Arcadius (37*2166), Eugenius (4*20), Honorius (16*545), 'Pavonius' (4), Theodosius (18*763), Valentinian II (12*640), obverse illegible (259*6523).

Reverses SALVS REIPVBLICAE, etc.

148	CK Rome	781, 796 (6*21), as 796 (1*1), 797 (1*14), as 797 (3), as 796-8 (3*12), 798 (1*11), as 798 (33), 799 (9), 800 (2*4), 801, 802, 806 (1*), as 799-801 (5), 809 (1*6), as 809 (2*), as 796-809 (1*7).
309	CK Aquileia	1105 (7*32), 1106 (7*49), 1107 (10*149), 1108 (2), 1111 (24), obverses illegible (1*28).
4	CK Thessalonica	1867, 1868 (2*1).
2	CK Heraclea	1983, 1984.
13	CK Constantinople	as 2183 (2), 2184 (4), 2185 (1*6).
5	CK Nicomedia	2404, 2405 (2), 2407 (2).

8	CK Cyzicus	2568 (1*), 2569 (1*3), 2570 (1*2).
2	CK Antioch	2768, 2771.
1	CK Alexandria	2905.
6	Gold	Arcadius VICTORIA AVGGG Milan mint-marks (6).
80	Silver	Reverses: VRBS ROMA (3*11), VRBS ROMA FELIX (1*), VIRTVS ROMANORVM (8*40), VOT V (2), VOT X MVLT XV (1), VOT V MVLT X (3), VOT X MVLT XX (7), VOT XXX MVLT XXXX (1), VOTA illegible (1), reverse completely illegible (2).
6423	Bronze	mms. illegible, all reverses SALVS REIPVBLICAE Arcadius (12*107), Eugenius (1*1), Honorius (6*305), Theodosius (15*385), Valentinian II (6*65), obverse illegible (81*5439).

Reverses uncertain

425	Mints illegible	Arcadius (5*20), Eugenius (2), Honorius (6*8), Theodosius (5*20), Valentinian II (23), House of Theodosius (55*281).

COINS STRUCK IN INDETERMINATE PERIODS

5163	Uncertain	3rd or 4th centuries (52*3360), 4th century (99*223), minims (262), totally illegible (82*1085).
77	Post-Roman	Otherwise unspecified (77).

Richborough Hoard 1926

	Original No.	*Actual No.*	*No. missing*
3rd century	13	13	0
House of Constantine	88	75	13
House of Valentinian	38	34	4
Maximus, Eugenius, Flavius Victor	19	14	5
House of Theodosius	868	182	686
Unassigned	176	1	175
Total	1202	319	863

See Richborough III, pp. 187–9, 192, 195

Maximinus		RIC 78.
Claudius II		RIC 266.
Postumus		RIC 85.
Victorinus		RIC 67.
Tetricus I		RIC 56, 100, as 100, as 121.
3rd century		Copies, reverse from Pax (2), Spes, Virtus, Indet.
317–330		RIC 7 Lyon 75 (var.), as Trier 313, Arles 232.
330–348	Trier	HK 49, 51, as 52 (5), 71, as 87, 88, as 88, copy as 88 (2) as 89, as 90, 93, as 104, as 105, 119, 132, as 137 (4), 138 (3), as 138 (3), 140, 142, 145 (2), 158 (4), as 158.
	Lyon	Copy as HK 184, 190, 241, 251.
	Arles	As HK 544.
	Rome	HK 617, as 635.
	Nicomedia	HK 1125.
348–402		As CK8, copy as 8, as 19, copy as 19, copy as 25 (8), as 40, as 76 (4), as 77 (6), as 96 (9), as 97 (2).
	Trier	CK 110, as 144 (2), 156, as 156, as 158 (3), as 160, as 162 (20), as 163 (18), as 164 (9), as 165 (3), 166, 167, 174.

	Lyon	As CK 263, as 275 (6), 317, 321, 340, 352, 372, 389 (8) as 389 (3), 391 (2), 395 (12), as 397.
	Arles	CK 457, as 477, as 487, 526, 528, 529, 559, 560 (6), 561, 562 (14), 565 (4), 567, 571 (13), 572.
	Rome	CK 713, 721, as 782 (9), 783, as 783, as 787, 788 (4), 790 (3), 791, 792, 793, 796, as 796 (9), 809 (2), as 809 (7).
	Aquileia	CK 965, 1076, 1091, 1092 (2), 1093 (3), as 1105 (2), 1107 (2).
	Constantinople	CK 2026, 2178.
	Nicomedia	As CK 2380, 2412.
	Cyzicus	As CK 2552.
	Antioch	As CK 2658, 2659, 2733.
348–402	Indet	House of Valentinian (1) Arcadius (3) Honorius (2) House of Theodosius (5) 4th century (1)

Hoard 1928. Area X, NE (+ 8 coins labelled simply 1928 hoard)

	Original No.	*Actual No.*	*No. missing*
3rd century	4	2	2
House of Constantine	16	0	16
Julian	1	0	1
House of Valentinian	3	0	3
Maximinus	3	0	3
Valentinian II	22	13	9
Theodosius	31	11	20
Arcadius	66	39	27
Honorius	19	0	19
Eugenius	2	0	2
House of Theodosius	138	60	78
Illegible	59	0	59
Total	364	115	249

Claudius II	As RIC 265.
3rd century	Copy reverse Pax.
348–402	As CK 162 (17), as 163 (6), as 164 (31), as 389, as 562 (2), as 796 (51), as 797 (5), as 798 (7), as 799, as 1105, 2570.

Hoard 1928. Pit 28, 0′–5′

Tetricus I	As RIC 98.
317–30	RIC 7 Lon 121(a).
348–402	As CK 76, as 77, as 162 (18), as 164, as 174, 514, as 562, 572, as 782 (4), 789, as 789, as 796 (10), as 798, as 1105.
Siliqua	DN HONORIVS P F AVG/VIRTVS ROMANORVM MDP (2) DN VALENTINIANVS P F AVG/VICTORIA AVGGG
Indet.	House of Theodosius (11) 3rd–4th centuries (1) 4th century (2)

Hoard Pit 204

	Original No.	*Actual No.*	*No. Missing*
Radiates	6	6	0
Urbs Roma	5	4	1
Constantine II	5	5	0
Constantius II	14	14	0
Constans	35	28	7
Theodora	1	1	+1
House of Constantine	9	10	+1
Indet.	5	5	0
Total	79	73	8

Gallienus		RIC 177.
Claudius II		RIC 104.
Tetricus I		RIC 86 (2).
Carausius		RIC 320 (2).
330–48	Trier	Copy as HK 48 (3), 49 (2), 51, copy as 51, copy as 87, as 88, 89, copy as 89 (2), 90 (2), as 90 (3), copy as 90 (3), 94, 95, 100 (2), as 105, 108, 126, 132, as 133 (2), as 137 (3), 138, as 138 (2), 148 (2), 158 (4), as 158.
	Lyons	Hybrid obv. as HK 184/rev. as 180, 184, 242, 267, 270, 274.
	Arles	355, 399, 416, 449, 455, as 458.
	Indet.	(2).
348–402		As CK 32, 33, as 33, as 162 (2), Indet.

1937 Hoard

317–330	RIC 7 Tr 432.
330–48	Copy as HK 89, 119, Indet.
348–402	Copy as CK 8, copy as CK 25 (2), 87, as 140, as 162 (5), as 164 (8), 167 (2), 387, 389, 391, 395, 562 (2), 565 (2), 571 (4), 572 (2), as 572, as 708, as 782 (2), 795, as 796 (9), 797 (2), 1103, 1107, 2193.
Indet.	House of Valentinian (1).
	House of Theodosius (18).

Hoard 1932. Area XVII/32, W Ext

	Original No.	*Actual No.*	*No. missing*
Constantinopolis	4	4	0
Constantine II	1	1	0
Constantius II	1	1	0
Constans	1	1	0
House of Constantine	4	4	0
Magnentius	1	1	0
Valens	3	3	0
Gratian	1	1	0
House of Valentinian	3	5	+2
Maximus	4	3	1
Valentinian II	4	4	0
Theodosius	16	16	0
Arcadius	30	30	0
Honorius	7	8	+1
House of Theodosius	57	57	0
Indet.	31	29	2
Total	168	168	0

330–48	As HK 52 (2), copy as 52 (2), copy as 87, copy as 93, as 137, HK 140, Indet. copy.
348–402	Copy as CK 25 (2), 51, as 96 (4), as 144, as 162 (26), as 163 (5), as 164 (20), as 165, 167, as 174 (2), 315, 353, 389, as 389 (2), 395, 560 (3), 562, as 562 (3), 565 (2), 571 (2), 572, as 767, as 785, as 789, as 796 (23), as 797 (3), as 798 (6), as 809, 1105, as 1105, 1106 (3), 1107, 1111 (2), 1957, as 1957 (2).
Indet.	Theodosius (2) Honorius (2) House of Theodosius (28).

Hoard Pit 220

	Original No.	*Actual No.*	*No. missing*
Carausius	1	1	0
Urbs Roma	2	2	0
House of Constantine	3	2	1
Magnentius	1	1	0
Valentinian II	4	4	0
Theodosius	8	8	0
Arcadius	11	12	+1
Honorius	7	9	+2
House of Theodosius	37	41	+4
Indet.	10	4	6
Total	84	84	0

Carausius	As RIC 98.
330–48	As HK 51, 58, as 249.
348–402	As CK 49, as 162 (18), as 163 (2), as 164 (5), 167, as 174 (2), copy as 249, 395 (2), 562 (2), as 562 (3), 565 (5), 571 (2), 572 (1), 783, as 796 (11), as 797, 801, as 806 (4), 810, as 1165, 1111.
Indet.	Valentinian II (1) Arcadius (1) House of Theodosius (7) 3rd–4th centuries (1) 4th century (3)

Hoard Pit 180

	Original No.	*Actual No.*	*No. missing*
3rd century	5	5	0
House of Constantine	7	7	0
Valentinian I	1	0	1
Valens	1	1	0
Victor	1	1	0
Valentinian II	11	7	4
Theodosius	2	4	+2
Arcadius	17	15	2
Honorius	4	2	2
Eugenius	2	1	1
House of Theodosius	40	34	6
Indet.	4	0	4
Total	95	77	18

Claudius II	RIC 256.
Tetricus I	Indet.
3rd century	Indet. (2), copy (1).
330–48	HK 50, as 87, as 137 (2), Indet.
348–402	Copy as CK 25 (2), as 97, as 158, as 162 (23), as 164 (8), 167 (2), as 171, as 174, 562, 566, 571, as 782 (3), 788, as 796 (13), as 797, as 798 (3), as 806, 2162.
Indet.	House of Theodosius (2).

Hoard 1929/30. Outer Fort Ditch, SW corner

In small pocket on inner side of ditch, about one third of the way down.

10 Radiates cemented together: 1 recognisable as CARAUSIVS, rev PAX AVG? vert sc.
1 has reverse of PAX AVG.
1 has obverse of ALLECTVS.

The Craft of Comb-making: An Experimental Enquiry

by PATRICIA GALLOWAY and MARK NEWCOMER

The increasing volume of finds from antler- and bone-working sites in medieval Europe has given us a very clear indication of many of the techniques used in comb-making. Most of the steps in the handling of the materials have been revealed by particularly rich finds in Scandinavia (Long, 1975; Thun, 1967: 30) and Poland (Hilczerowna, 1961; Wilde, 1953; Cnotliwy, 1973: 312–14). These finds include partly finished combs and several kinds of trial pieces which show some of the methods of riveting and tooth-cutting. The number of spoilt and discarded combs in various stages of construction, however, is disappointingly small, probably because such pieces were taken apart for re-use. This means that while many techniques are well known and it is generally agreed that the main comb-making techniques remained constant over the entire period when composite combs were made, many details of the steps in the construction of a bone or antler composite comb are not completely defined (Thomas, 1960: 75–6; Hilczerowna, 1961: 95; Cnotliwy, 1973: 312–14). For this reason we felt that experimental construction of such a comb might answer a number of questions regarding the ordering and fine details of these procedures and might further suggest whether such construction could have oeen done in well-defined stages so that workshops could have employed mass-production methods, as has been suggested (Hilczerowna, 1961: 96). We also wished to know if the practice of a particular workshop might be recognised on the basis of the ordering of steps. Finally, there were a number of questions of technique which could well be investigated at the same time, with a view to establishing the range of tools required.

For the experiment it was decided to execute several trial pieces and to construct one comb from the double-sided form class. This is a class which seems to have developed in Roman provincial contexts, on the model of the Roman soldier's one-piece boxwood comb but under the influence of the Germanic use of bone and antler for single-sided composite combs. Our double-sided comb, copied from an example excavated by D. R. Brothwell in the Orkneys (Brothwell, 1977: plate I), would require the same techniques as those used to construct simple Roman provincial, Saxon, and medieval models (Keller, 1971: Fig. 50:1; West, 1969: Fig. 10:6; O' Riordain, 1949: Fig. 13:70, 284; Cnotliwy, 1973: Fig. 96).

A table summarising the steps in comb construction which we will discuss is provided in Table 1. This table incorporates the results of the practical experiment. We will describe the steps in the experiment as they fit into a discussion of the process of comb-making.

First, we should briefly place the craft in context as a craft. Workshops for antler- and bone-working must be seen against the background of a settled town or village

Table 1 Summary of experiment (Note: the times shown here represent only a record of the experiment. They include time for 'apprentice' practice, and we estimate that an experienced professional could cut all these times by half to two-thirds)

Activity	Toolkit, etc.	Time	Output
Pretreatment	None		
Making parts	Dry shed deer antler Hacksaw Pencil ½ in chisel Hammer Vice	4 hr 30 min	5 tooth segments 2 connecting plates
Fitting parts	Wood rasp Single cut file Vice Wooden jig		
Drilling	1/8 in crank drill Countersink 'C' clamp Single cut file Vice	30 min	5 holes
Assembly	1/8 in copper rivets Small hammer Hacksaw Vice	1 hr 30 min	5 rivets secured finish-filing
Cutting teeth	Single cut file Rule Pencil Hacksaw Vice	3 hr	84 teeth cut
Shaping teeth	Files Needle files Nail files Single cut flat Steel burin Emery cloth Vice	3 hr 30 min	84 teeth finished
Decoration	Pencil Rule Awl Dot-in-circle drill bit Crank drill	30 min	16 dot-in-circle motifs
Finishing	Single cut file Buffing compound Rag	30 min	Bevelling, polishing

economy; for the high middle ages this can be supplemented with manorial workshops. The reason for such a development of the craft as an industry is that of supply. Bone- and antler-working would have three major sources of raw materials: hunting wild animals, gathering shed antler from wild animals, and butchering domestic ones. All of these sources might vary according to the social context, but what evidence there is seems to imply that comb workshops tended to depend heavily upon one or another of these, without necessarily excluding the lesser sources (Hilczerowna, 1961: 94). The primary raw material used, therefore, would depend upon such factors as the scale of livestock raising or restriction of hunting privileges. The material used had little effect upon the forms which were executed. Nor did it have any appreciable effect upon the tools and techniques necessary for working it. In this experiment antler was used. Tools were modern ones, selected with an eye to the types available in the medieval period (Plate I). In each step we tried to achieve the results attained by the medieval craftsmen using the simplest and most efficient means. Where there was no direct archaeological evidence to guide us, the finished model served.

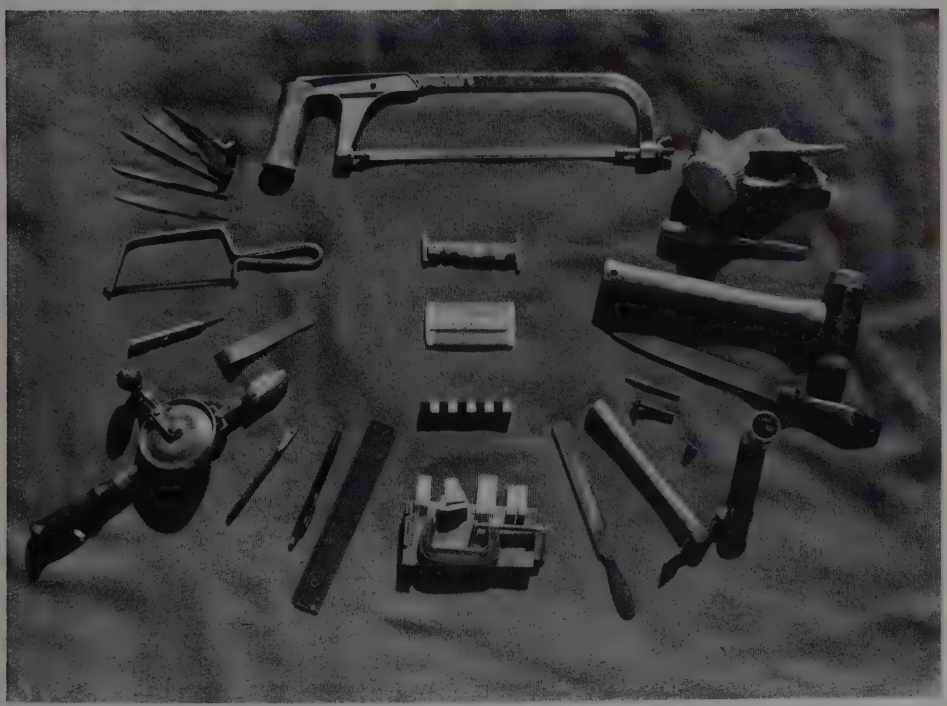

Plate I Tools and materials used to make a double-sided composite antler comb, with finished comb and ancient model in the centre. Scale = 10 cm.

There has been some evidence that the material to be used was subjected to some softening process before it was worked. Excavation on town sites in eastern Europe has revealed pits filled with raw materials for bone- and antler-working in conjunction with shop sites. These pits sometimes contained deposits from solutions used for softening the material, such as lye, oil, and vegetable acids (Cnotliwy, 1956: 176). Such evidence is not obtained from the majority of sites, and our experience working with untreated antler suggests that pretreatment was not indispensible, but it has been pointed out that for the very long single-sided antler combs made in some areas in the 13th century, it would be necessary to plasticise the connecting plate strips in order to flatten them (Cnotliwy, 1973: 313). Practical experience in the conservation of such combs, which tend to adopt the curved shape of the original material as they dry unless dried in a clamp or under weight (cf. Long, 1975: Fig. 9:e), implies that this assertion may be correct. The general impression of the experiment, however, is that necessity for pretreatment would depend upon the quality of the tools available. We did not treat the material at any stage, but had we worked with tools of poorer metal pretreatment would probably have been advantageous (Newcomer, 1976).

Whether pretreated or not, material destined for comb-making had first to be cut up and shaped into standard units (Hilczerowna, 1961: 95). For composite combs these units were tooth segments and connecting plates (this terminology, as throughout, from Galloway, 1976). Preparation of tooth segments was a simple matter and tended readily towards standardisation, as the width of the tooth segment was already automatically standardised by the limitations of the material. The grain of the material had to run vertically on these pieces, or the teeth would break off when cut. This meant that lengths of antler or bone of the required size for single- or double-sided combs would first be sawed off. These cylinders could then be quartered and the resulting pieces shaped (Hilczerowna, 1961: Fig. 33); thus the width would be effectively limited in range by the diameter of the bone or antler itself. Measurements of the widths of tooth segments on existing combs shows that the range is constant between 1.0 and 3.5 cm. In the experiment, the procedure used for preparing components was as follows:

1. Preparation of tooth segments and connecting plates: two stages (Plate II)

A. Cutting out parts: material and tools: dry shed red deer antler, hacksaw, pencil, ½ in chisel, hammer, vice.

Technique: Parts of comb to consist of tooth segments (about 5 x 2 cm) and two connecting plates (about 9.5 x 1.5 cm). Lengths are marked in pencil on the beam of the antler, with the grain running in the direction of the long axis of the parts. Saw is used to saw through the outer compact tissue, after which the parts can be prised loose with hammer and chisel, holding the material in the vice. All work was done with the antler dry.

B. Shaping parts: tools: wood rasp, vice.

Technique: Rasp away as much of the spongy inner tissue and of the rough outer surface as possible to obtain a thickness of about 5 mm.

Plate II Blanks for tooth segments and connecting plates, with antler from which they were sawn. Scale = 5 cm.

The next stage of construction, one which has received little attention in standard accounts but which practical experience shows to be necessary, is the fitting of the parts before their assembly. The preparation process produces a series of small plates, but before the plates may be joined permanently a certain amount of finishing will ensure the perfect fit which enables the joining to remain effectively permanent. The results achieved by medieval craftsmen could not have been obtained without such attention to fitting.

2. Fitting parts

Tools: wood rasp, single cut file, vice, wooden jig.

Technique: Flatten inner surfaces of both connecting plates, using the rasp first, then the single cut file; the inner surfaces will fit against the tooth segments and must be perfectly flat. File the long edges of the tooth segments until they fit against each other with no gaps. Place the segments, in the order they will lie, into a wooden jig and file the surfaces until they are as plane parallel as possible and about 3–4 mm thick.

Once the parts have been fitted, they must be assembled. At this point, however, it is obvious from the many examples from all periods which have decoration cut by rivets

(Unverzagt, 1929: Fig. 8:10; Biddle, 1970: Plate XLVIII:b; Duwel and Tempel, 1968 [1970]: Plate III; Blomqvist, 1942: Fig. 54; Cnotliwy, 1973: Fig. 39) that before the riveting was done it was very frequently the practice to apply decoration to the connecting plates. The example of one decorative motif that we often see cut by rivet holes can be cited to establish this fact. This motif is the familiar 'dot-in-circle' or 'bull's-eye', which we made using a drill bit adapted to the purpose. It is also possible to cite examples (Blomqvist, 1942: Fig. 21) which show that decorative motifs, particularly horizontal lines, were used for guidelines for centring rivet holes longitudinally. This is clearly one step in the process of comb-making whose order is optional, and one of the places it may take in the sequence, particularly for the connecting plates, is just before the assembly of the parts.

The parts of composite combs were almost invariably held together by iron or bronze rivets, though rare examples using bone or antler pegs are known (London Museum, 1967: Plate LXXXVIII:2; O'Riordain, 1949: 81). Examination of actual specimens shows that the cheaper iron rivets were always commoner than bronze rivets, but the bronze gained in popularity from the Roman period on. It is unlikely that rivets were ever applied without drilling holes to receive them, and we detail that process next.

3. Drilling

Tools: $^1/_8$ in crank drill, countersink, 'C' clamp, single cut file, vice.

Technique: Place segments in correct order, place one connecting plate on top, and mark a point along the centre line of the plate over the middle of each tooth segment. Remove the marked connecting plate and place its inner surface against the inner surface of the second plate. Holding both in the vice, drill holes at the marked positions. Place one drilled connecting plate in position on top of the tooth segments, hold in place with a 'C' clamp, and drill through the segments, using the holes in the plate as a guide. (This method of drilling was used because it is difficult to hold all the parts of the comb together and drill the holes through three thicknesses at once. It would probably be possible to devise a jig and clamp arrangement to do this, however, thereby much speeding the process.) Countersink holes in the outer surfaces of the connecting plates to allow for riveting. Bevel outer surfaces of the connecting plates with a file if desired, as this cannot be done easily after assembly.

It is possible that the problem of holding the pieces together in order to drill the holes, which we have seen is a major one, may have been solved in a different way, with an animal glue. Traces of glue found on excavated examples (Behn, 1938: 178 f.) would most logically have been applied for this purpose, since if the comb were later exposed to moisture the glue would be useless and possibly troublesome. It may be that gluing was more common than the evidence suggests, since once the article was riveted it could have been soaked away. It is worth noting, however, that the method we used would favour the perfect alignment of the connecting plates and would thus produce a stronger comb.

And experiment showed that the use of animal glue, which requires heating of the pieces, together with the awkwardness of clamping numerous small pieces together, make for an extremely tricky procedure which is unlikely to have been routine.

The next step is the application of the rivets. We have used the common plan of applying one rivet in the middle of each segment, but two other practices are known: one rivet between each pair of tooth segments (Trondheim N30966 in Long, 1975) and one or more continuous rows of rivets placed as close together as possible (Blomqvist, 1942: Figs. 26–33). In the latter instance the preparation of connecting plates also often included the making of one or more lengthwise grooves to take the rivets. We chose copper rivets for the complete comb for ease of working and appearance, but the execution of a trial piece using solid iron rivets showed that they could be worked cold in the same way.

4. Assembly (Plate III)

Materials and tools: $^1/_8$ in solid copper rivets, small hammer, hacksaw, vice.

Technique: Loosely assemble parts by fitting rivets through holes. Saw off each rivet so that only about 0.5 mm protrudes from each side of the comb. Hold each rivet in turn on the anvil (e.g. top of vice) and gently peen each until countersink is filled, making sure each segment is precisely perpendicular to the connecting plates.

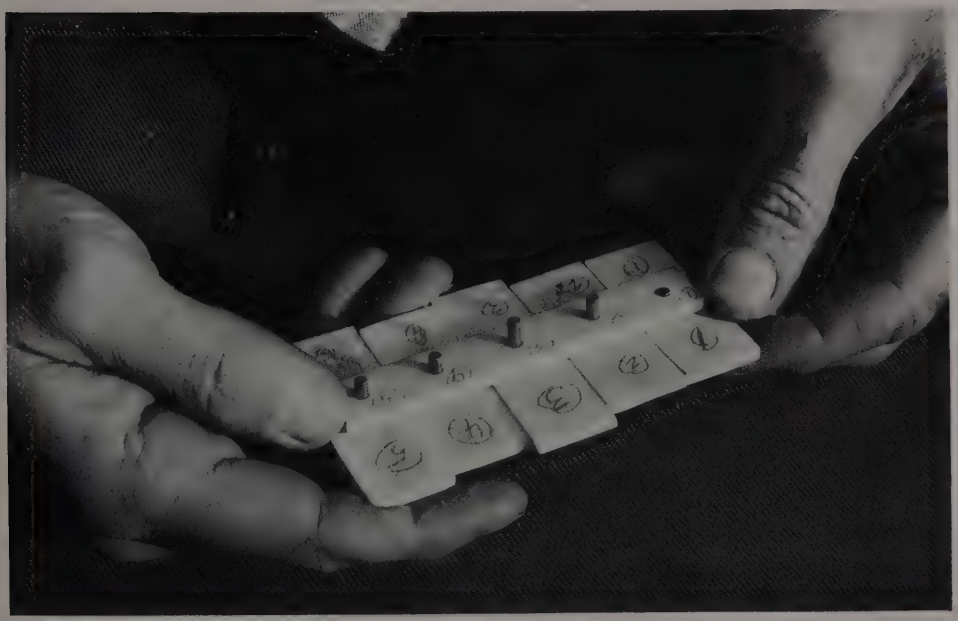

Plate III Tooth segments and connecting plates loosely assembled with copper rivets.

The most problematic and precarious step in the entire process was the cutting of the teeth. An unsteady hand or unskilful manipulation of the saw was capable of spoiling the entire comb at this stage, after all the work of assembling it had already been expended (Trondheim N26164 and N16444). In cases where decoration had already been applied, and it seems likely that this was frequently the case, there was even more at stake. It is probable that when such an untoward event occurred the damaged segment could be removed by drilling out the rivet, and another could be put in its place (a process facilitated by standard-sized segments), except in the case of types with many close-set rivets. Our experiment suggested, however, that with care such mistakes could be avoided.

Before we detail the process of sawing teeth, it should be said that previous to this step in the sequence but after the assembly of the comb is another advantageous point for the application of decoration. This is most particularly the case for the relatively common decoration found on the wider uncut zones of the end tooth segments (Trondheim N26164). Execution of decorative motifs on these segments at this point would be advantageous because there would be no danger of damaging already-cut teeth and because the entire object would be at the point of its greatest structural strength; in addition, the entire comb would be easier to hold in the vice than an individual segment, though our experiment showed that the assembled comb did not need to be held particularly firmly for decorating.

5. Cutting teeth (Plate IV)

Tools: single cut file, rule, pencil, hacksaw, vice.

Technique: File segments perfectly flat where teeth are to be cut. Place comb in vice with the segments vertical and saw between each of the tooth segments. Lay out marks with rule and pencil for remaining teeth at 2 mm intervals. The cuts between segments should be made before laying out and cutting other teeth, as otherwise one of the tooth cuts will probably be so close to a joint as to make sawing difficult. Cut remaining teeth using short strokes and lifting blade after every few strokes to be sure cut is properly aligned. Stop when saw hits connecting plate. (It is better to hold the saw at an angle and to cut each tooth from both sides of the comb at the base, such that a triangle of uncut material remains at the base of each tooth bordering the connecting plate. Cutting right to the base of each tooth, as was done in the experiment, weakens the tooth and makes the comb harder to clean.)

This account of the procedures we used shows that there are many very small problems of technique to be solved in the cutting of the teeth. It is not certain, for example, that the practice of making initial cuts between segments is an authentic one, since examples can be cited in which the craftsman has been forced to cut a very narrow tooth next to the joint (Trondheim N30966), but it does seem to explain how very regular teeth could be cut in spite of the varying widths of the tooth segments. We used pencil and rule to lay out the teeth, but it is unlikely that such a laborious method was followed

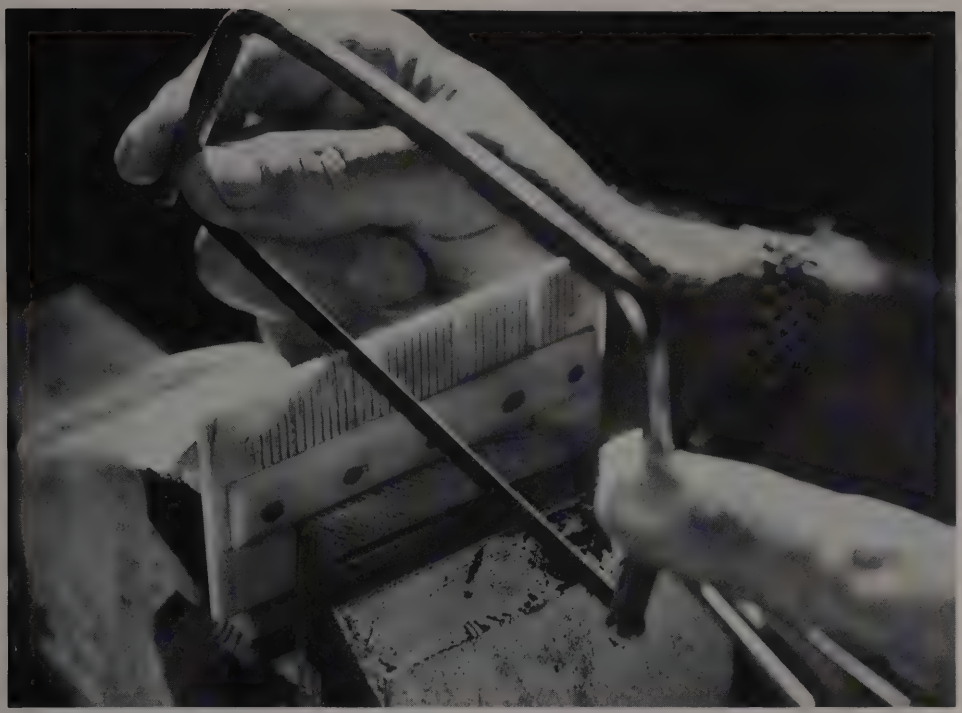

Plate IV Cutting teeth.

in the workshops; far more likely that a saw with appropriately spaced teeth could double to scratch guidelines for sawing, leaving behind no trace of its use. An experienced comb-maker would probably be far less cautious of his alignment in cutting that we were, but again it is difficult to estimate how long it would take to attain this level of skill. Experiment did, however, suggest that the phenomenon of angled cuts, which leads to the nearly invariable saw-marks on the connecting plate, was the result of an intentional effort towards strengthening the bases of the teeth as we have described, since the required angle does not allow the remainder of the tooth's length to be cut free to a sufficient depth. Experiment could not decide if a bow-saw or a saw with a back should be favoured, since both could be manipulated to achieve the desired results. Some combs show saw-marks only halfway along each connecting plate but at opposite ends, implying that the comb was reversed in the vice after half the teeth had been cut (Trondheim N23485). It should also be noted that most bone and antler combs have the lengths of their teeth graduated towards both ends, probably for strength. This graduation would probably be achieved by eye.

This experiment did not include the construction of a single-sided comb, but another procedure would be executed at this stage for this form class. In the majority of

cases the connecting plates for single-sided combs were brought more or less to their final shape before assembly, just as was the case with the double-sided ones. This shape, however, was not limited to the regular rectangle usual on double-sided combs; instead, all sorts of fanciful shapes, from a simple arch or triangle to a rounded top with upcurved ends, were used. Tooth segments, however, were executed as rectangles. Trimming the tooth segments to shape singly would have been too difficult and time-consuming, so the solution was to assemble the comb and then trim the parts of the tooth segments protruding along the top edge of the comb until they were level with the back of the connecting plates (Ulbricht, 1977: Fig. 1), giving the connecting plates themselves any further shaping needed at the same time (Trondheim N21848). In exceptional cases there were two variations on this procedure. Sometimes, when the shape of the connecting plate was such that cutting extra-long tooth segments to fit between them was difficult, a small extra piece might be inserted at the assembly stage to fill in the gap above the standard-length tooth segments (Biddle; 1970: Plate XLVIII:b). The same procedure of inserting extra parts might also be used to provide an intentional protrusion from between the connecting plates when the decorative scheme called for fanciful shapings of the whole comb. In a similar vein, the protruding tooth segments might not be trimmed exactly flush with the back of the comb, but parallel, leaving a border which could be further shaped into scallops or zigzags and even perforated (Cnotliwy, 1973: Figs. 55 and 56; Nenquin, 1953: Plates IX and X). All of these procedures except the insertion of extra pieces could be carried out at the time when the teeth were cut, as it was simply a matter of dealing with the side opposite the teeth on a comb which would have but one row of teeth.

The order in which these procedures would be carried out then comes into question. In the experiment we did not attempt to execute more than one gauge of teeth, but when rows of fine and coarse teeth were to be cut the order in which they were cut presumably would have been a rather individual one, based upon skill or mood and likely to change even with the same craftsman. Similarly, the decision to cut teeth or decorative border first would depend upon individual judgement as to which might prove the more fragile and liable to damage while the other was being executed. Some objects from Scandinavian sites, deeply grooved long bones of cattle which are definitely not skates (Trondheim N5366), may have presented a solution to the problem, as the cut teeth could be inserted into the groove until the connecting plate was flush with the bone, and the whole held securely for working either another row of teeth or decoration. In the simple case, however, where the protruding tooth segments were cut off flush with the back, this would be done before the cutting of the teeth.

Once the teeth were cut they were not finished. If left virtually rectangular in section they would not function smoothly, and for this reason teeth were always tapered to some extent to obtain a rather lens-like section.

6. Shaping teeth

Tools: files (needle files, nail files, single cut flat file), steel burin, emery cloth, vice.

Technique: Hold comb in vice and widen gaps between teeth first, using needle files

at tips and nail file or emery cloth at bases. Bevel sides of teeth with needle file or burin. Bring entire tooth row to a sharp point with the flat file, moving it down the length of the comb.

Because this comb that we made was rather a simple one and the decoration was to be executed more as a test of tools and material than as an effort of artistic composition, a row of dot-in-circle motifs was next inscribed upon the connecting plates. It is quite possible that for simple decoration of this kind this was in fact the sequence position allotted to decoration, but other positions in the sequence were, as we have noted, more appropriate for more complex decoration on different portions of the comb. This place in the sequence has to recommend it the fact that by this point all risk of construction error has passed, but the slight risk of damaging the finished teeth may be brought as an argument against it unless we postulate the use of the sort of grooved bone holder mentioned earlier.

7. Decoration (Plate V)

Tools: Pencil, rule, awl, drill with dot-in-circle cutter.

Technique: Lay out centres of dot-in-circle design with rule, mark with awl, drill to uniform depth.

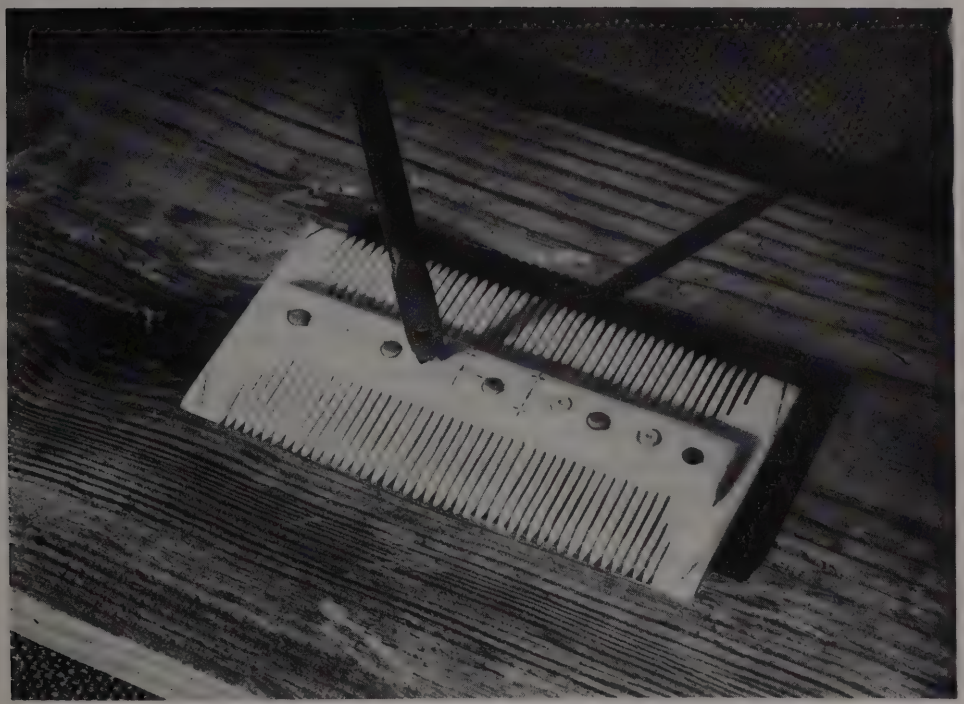

Plate V Cutting dot-in-circle motif on nearly completed comb.

Decorative motifs on combs are as varied as on any product of the bone- or antler-worker's art, though the dot-in-circle appears very frequently. Incised lines could have been made with a variety of tools, from saws (particularly when the connecting plate to be decorated had a markedly convex surface) to knives. More complicated curved motifs like the guilloche could have been incised using an instrument like a scribing compass. Unfortunately we can only suggest a range of tools; either those used were multi-purpose and therefore 'invisible', or such tools have not yet been found in excavations.

For really fine combs there was doubtless a final finishing stage which brought up the smoothness and polish still obvious on many excavated combs. The need for this final finishing may explain the presence on many Scandinavian sites of small worn pieces of fine volcanic pumice.

8. Finishing

Tools: single cut file, buffing compound, rag.

Technique: Round corners of comb with file. (It is convenient to leave the corners of this type of comb square as long as possible, as it makes checking the symmetry of the tooth row, etc., easier.) Polish with rag and buffing compound.

The finished comb is shown in Plate VI.

The experimental construction of a composite comb has answered a number of questions. The schema shown in Fig. 1 lists the steps and shows how they work in sequence, including optional procedures which may be omitted without affecting the sequence or the operational utility of the finished comb. Several points may be made with reference to this schema. First, the order of the main steps is invariable, because succeeding steps cannot be carried out until preceding ones have been completed. Second, it is clear that several of the steps constitute non-specialist procedures which could be carried out continuously without regard to a single unit of production. This is especially obvious in the case of the initial preparation of standardised constituent units for the composite comb. The only decisions that need be taken are the length of the proposed finished comb (to regulate the cutting of connecting plate blanks) and whether it is to be single-sided or double-sided (tooth segments will be shorter if for single-sided combs, longer if for double-sided ones). But once these decisions are made, the preparation procedures may go on continuously, building up supplies of blanks which will be used later.

The same is true to a more limited extent for several other steps. The fitting of the blanks implies a choice of the specific pieces which will make up the finished comb, but a system of simple markings and containers would make it possible for this procedure to be carried out repeatedly for many sets of constituent parts. It is unlikely, on the other hand, that drilling and assembly were separated in practice unless a system of this kind was used or the drilling was immediately followed by insertion of rivets to hold the whole

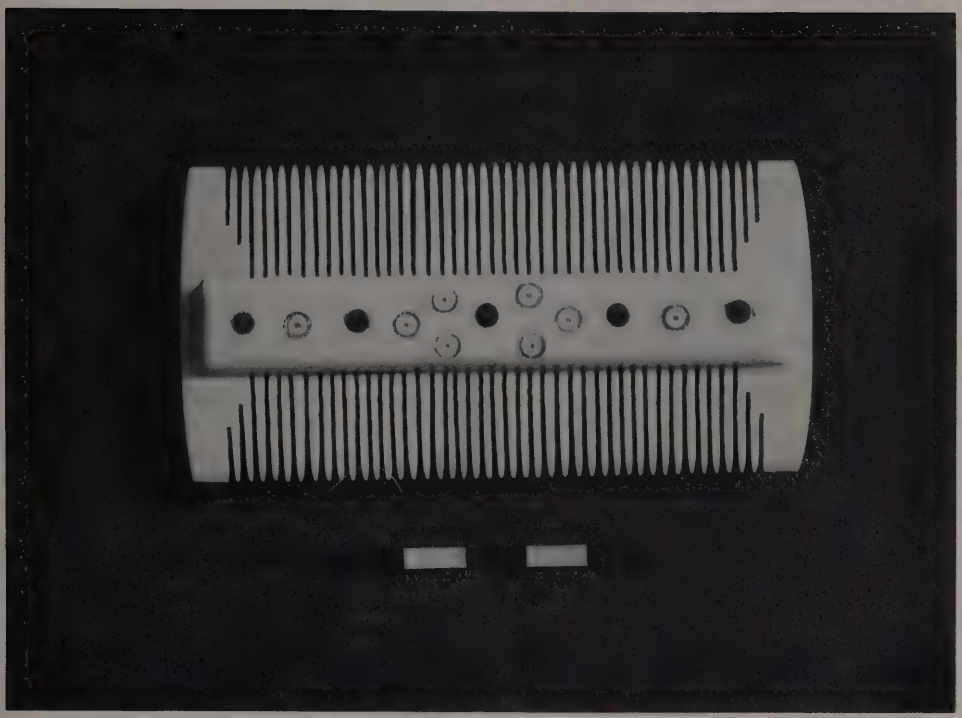

Plate VI Finished comb. Scale = 5 cm.

together until it could be passed on for rivet-trimming and peening. It is also unlikely that tooth-cutting and subsequent shaping were separated, if only because of the level of responsibility involved as the last steps were executed.

On sites where it is possible to examine large assemblages of combs which may be considered to be the product of one or a group of workshops serving an economically differentiated population, it seems to be the case that two general varieties of comb were made: plain undecorated 'mass-production' combs of relatively simple shape and elaborately decorated, sometimes more elaborately shaped, 'special-order' combs (Hilczerowna, 1961: 96). Where this was the case, the manner of construction might be affected in that the interspersed decoration steps in the sequence would be present for the 'special-order' combs and absent for the rest. For reasons discussed above it is unlikely that batches of plain combs were made, to be decorated on request, except in the case of less complex decoration such as we have used. In this latter case, final finishing might be carried out on all combs before optional decoration, with an additional minor smoothing carried out if necessary for decorated combs.

Discussion of these hypothetical 'special-order' combs cannot go forward, however, without reference to specific examples, since the outstanding examples of such combs

Fig. 1 Sequence of steps in comb construction (* = optional steps).

differ rather substantially. It is probably necessary to distinguish also between combs which are clearly elaborate versions of simpler contemporary models – the true 'special-order' combs – and those which seem to have constituted a special line of 'signature' combs which were always elaborate in conception and execution. This latter class is represented by the single-sided triangular Roman provincial combs of late 4th-century date (Biddle, 1970: Plate XLVIII:B; Boeles, 1951: Plate XXVII:6, Nenquin, 1953: Plates IX and X) and the single-sided so-called 'Frisian barred' combs of the following century (Macgregor; 1975: Hills, 1977: cremation 1475). The true 'special-order' combs, on the other hand, can be singled out on the basis of their elaboration of an established basic conception. This is the case with the double-barred Roman double-sided comb with zoomorphic ends from the Beadlam, Yorkshire, Roman villa (Stead, 1971: Fig. 5:4; present Fig. 2), and the single-sided long comb found in the Oseberg ship-burial (Grieg, 1928). Both combs have rather precise parallels from other sites widely separated geographically (Haupt, 1970: Fig. 31:3, 4; Wilde, 1953: Table Vb:35; Waterman, 1959: Fig. 16:1), and both can also be compared to far plainer combs of the same period made along the same lines. For this reason they can be identified as true 'special-order' combs, and if we look at their special departures from the norm we can examine the placement of the optional steps in construction.

To take the Roman provincial comb first, we can first observe that it is one of three known identical combs, which vary in one particular that suggests that they may even originally have been a set: the Beadlam comb's connecting plates have groups of three vertical incised lines, the Steinfort comb two, and the Jakobwüllesheim comb four (one

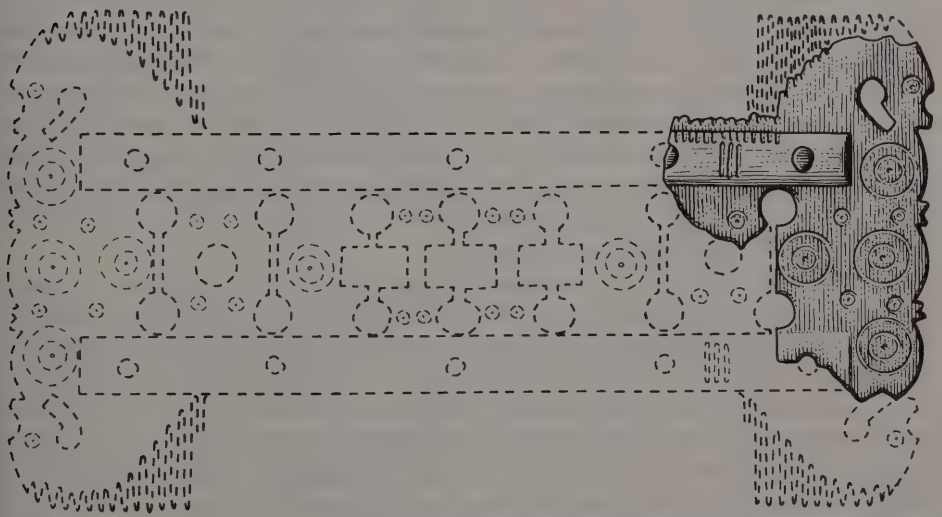

Fig. 2 Comb from Beadlam, Yorkshire, reconstruction based on combs from Steinfort and Jakobwüllesheim. (Drawing by N. Griffiths)

may conjecture that there is a 'one' to be found somewhere). The fact that they are so very identical even suggests that the shaped ends may have been cut to a pattern. But let us follow the unusual steps that would have been required in construction. Most immediately it is obvious that a different set of constituent parts would be required for their construction because of the double connecting plates and the especially wide end segments, but this might merely mean that the usual wide flat connecting plate of the period had been sawed in half lengthwise and the widest of a stock of tooth segments chosen. The pieces would be prepared and fitted as usual, with the connecting plates probably given their simple decoration before assembly of the parts, though this would not be necessary. The assembly itself follows the plan, not unusual for the period, of between-segment placement of the rivets except at the ends, where the rivets are placed so as to fall directly on the end segments.

After assembly but, as seems obvious from the carefully integrated placement of the graduated teeth at both ends, before the cutting of the teeth, the very elaborate decoration was applied. Undoubtedly the decorative perforations were first made, since they serve as loci for the dot-in-circle motifs. Those that appear between the connecting plates could most conveniently have been made first, with no fear of breaking ends not yet shaped. The round perforations were simply drilled out, while the rectangular ones probably started with two round holes drilled side by side, shaped to a single rectangle with a file. Incised ornament, except for the 'eyes' on the zoomorphic ends, could have been added next, and finally the ends would be given their elaborate shaping and perforation and the 'eyes' applied. Next the teeth would be cut and shaped, following the design at the graduated ends to create a 'mane' effect. Final finishing would follow as usual.

In marked contrast to the preceding example, the decoration of the Oseberg comb is limited almost entirely to the connecting plates, and the fact that this very impressive decoration is cut by rivets implies that is was carried out after the fitting stage and before assembly of the comb. There is again a strong unity of design, very carefully planned and executed. Because the connecting plate is convex in section, the decoration must have been carried out after the shaping of the plates. Because of rivet placement we must assume that the upper edges of the tooth segments could not have been trimmed until after assembly, as we have suggested was the usual practice with single-sided combs. The remainder of the steps would follow as usual.

These two examples demonstrate several points. First, they show that the production of a 'special-order' comb, at least when such combs were of the outstanding quality of these, was not simply a matter of adding decoration as an afterthought. Except for the initial preparation of the constituent plates, such combs were probably executed by a single master comb-maker, who could select appropriate materials from already prepared blanks but whose idea of the appearance of the finished comb had to govern the remainder of its construction. Second, they confirm our hypothesis for the ordering of decoration for different areas on the comb, but they emphasise the invariability of this order. Finally, they show that no matter how excellent the product, the comb-maker was constrained to the sequence that we have suggested.

Because this sequence is so necessary, except for the small variations we have mentioned at the tooth-cutting/back-decorating stage, it is not likely that individual workshop practice can be identified by a particular ordering of steps. Aside from the obvious special decorative patterns (which in any case could be and were frequently copied), it seems that the best hope for identifying workshops is more appropriately to be placed on more subtle variations, like the placement of rivets, the method of sawing, and the final shape given to the teeth. The experiment has suggested that these processes, because they present the greatest freedom of choice, can be combined with stylistic factors to help identify not only the period but even the source of a bone or antler comb.

Abstract

This paper describes an experiment designed to investigate the methods used in the craft of comb-making using bone and antler raw materials in dark age and medieval Europe. Through the construction of a complete double-sided composite comb and several trial pieces, questions of required tools, sequence of procedures, and necessary techniques are addressed. After the general sequence of steps in the construction of a complete comb is described, two examples of more elaborate combs are examined in detail from the point of view of construction, showing how the sequence of structural steps established in the experiment apply even in the case of atypical 'special-order' combs.

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Publication: An Obligation[1]

ARCHAEOLOGICAL DOCUMENTATION IN BRITAIN TODAY

by CHERRY LAVELL

This is a Janus paper which looks back to see why we have reached a point of crisis in our publication arrangements, and looks forward to the coming shifts in the meaning of 'publication' and in the manner of its expression. It is the first general review of publication in British archaeology, although many people have provided threads for me to weave together and embroider upon, as will be apparent from the citations. Although most of the discussion relates to excavation reports, it should be remembered that other kinds of archaeological report are affected by many of the same problems.

'There is a consensus of opinion that an excavation is not finished until a full report is published or the evidence made available in another form.' Philip Barker's statement (1977: 222) both expresses the tenet which has informed British archaeology for decades, and foreshadows a change in the way that tenet is given substance. The principle of full publication derives, of course, from the father of modern British archaeology, General Pitt Rivers, who said over 80 years ago, 'A discovery dates only from the time of the record of it, and not from the time of its being found in the soil'. The General also said of his excavations, 'everything has been recorded, however small and however common . . . There is no knowing what may hereafter be found to be most interesting' (Pitt Rivers, 1898: 27, 28).

We still do not know what future generations will find most interesting, though we can be certain that they will lament our obtuseness in failing to see and to record the things they most want to know, just as we have done with our 19th-century predecessors. If we knew the questions of the future we should already be asking them; in default of that, therefore, we feel obliged to keep as our goal the obligation to observe and record our excavations with as much fulness and accuracy as possible. The theory has always been that a total reconstruction of the site ought to be possible at any later time; though, as I shall show later, that theory is now crumbling, and the whole question of what is meant by 'publication' is undergoing anxious reassessment.

The structure of British archaeological publication

Perhaps 'structure' is the wrong word to use, in view of Christopher Hawkes's remarks in his Presidential Address to the Prehistoric Society a generation ago (Hawkes,

[1] The quotation in the title is from Barker, 1977, Chapter 13 heading.

C., 1951: 12) about 'the sprawling and gaping disorderliness of our printed literature'. None the less, archaeological publication does fall into certain reasonably well-defined categories which are worth a brief examination. In outline, we have the county or district journals; monographs of many different kinds and from an increasing number of sources; and an unplumbable depth of what the librarians call 'grey' literature, the small-run duplicated publication distributed locally or to a few specialists. I shall look briefly at the sources of money to pay for these publications, and the shift in these sources over recent years; I shall examine the reasons for the undoubted crisis in archaeological publication and look at some solutions currently being canvassed. Because all this published archaeological information needs some kind of central analysis and notification, I shall explain the function of bibliographic tools; and because so much publication depends on setting new information in a pre-existing framework it will be necessary to make a (very cursory) survey of means of obtaining such information through libraries, information centres, and data banks. Finally, because I firmly believe that none of this activity is justifiable without constant reference to the public which pays for it through its taxes, I consider the ways in which we attempt to explain ourselves to the world at large, through books written for the general public and through the use made of the mass media.

A subsidiary aim of this paper is to provide an extensive (though not exhaustive) bibliography on archaeological publication and related topics.

Let us first look, in Table 1, at the many different types of archaeological publisher in the UK today.

There is little government involvement in the issue (as opposed to the compilation) of publications, and there are few commercial publishers on the monograph side. Relatively few theses are published in monograph form, and are usually greatly modified if they do so appear.

Journals

From the earliest days, much of our publication has been entrusted to journals. The Society of Antiquaries of London, the doyen of our associations, has published its large-format *Archaeologia* since 1770, and added a series of *Proceedings* in 1843. The majestic and authoritative nature of these two publications was never quite matched by our other national societies of the 19th century, those schismatic siblings the Royal Archaeological Institute and the British Archaeological Association, but they also published regular transactions of good repute. In the 1850s and 1860s there also sprang up many local societies in which the clergy, aristocracy and professional classes could share their interest in the monuments of the past and issue regular journals (Piggott, 1974). Even now the county societies, some 50 of them in England–Wales–Scotland, remain one of the principal foci of archaeological publication, although most of them are facing increasing difficulty from today's pressures and some of them are coping less well than others (see p. 102 below).

The number of such journals remained relatively static until the post-World War II period, when the growth of ever more specialised interests led to the initiation of

Table 1 Types of publication containing archaeological material in UK

A.	Journals	Types International e.g. *World Archaeology* National e.g. *Britannia; Archaeologia Cambrensis* County/local e.g. *Oxoniensia* Popular e.g. *Current Archaeology* Informal e.g. *Archaeology in Wales*
B.	Monographs and conference proceedings	Publishers HMSO for DoE and RCHMs Society of Antiquaries of London CBA Societies (national or local) British Archaeological Reports University presses Museums (national or local) University departments Public utilities or other non-archaeological bodies Local authorities A few commercial publishers
C.	Non-commercial publishers' information for general public	HMSO for DoE (site guides, etc.) Archaeological trusts/units CBA Museums Local authorities
D.	Commercial publishers' books for general public and schools	e.g. Batsford, Shire, Dent, Collins, Croom Helm, Edward Arnold

numerous new journals on narrower topics: *Medieval Archaeology* (1957), *Post-Medieval Archaeology* (1967), *Vernacular Architecture* (1970), *International Journal of Nautical Archaeology and Underwater Exploration* (1972) and so on. *Landscape History* (1980) is the newest of these, and doubtless there will be another couple by the time this appears in print. Only a tiny handful of these new journals come from commercial publishing houses (for instance, *World Archaeology* and *Industrial Archaeology Review*); the rest, true to British tradition, are run as part-time activities and are funded mainly by members' subscriptions, though a proportion of the articles published qualify for Department of Environment grants.

In all, the United Kingdom and the Irish Republic between them have over 250 periodicals of which the archaeologist must be aware; a substantial proportion are devoted to archaeology, while the rest contain some archaeological material and must be regularly scanned on that account.

Monographs

In thinking of monographs one should not forget important works like those of Bateman (1861) and Greenwell (1877), and yet it is inevitably Pitt Rivers's four great blue-and-gold volumes which are seen as the real start of our monograph tradition. Printed and privately distributed from 1887 to 1898, these fine works gave immensely detailed descriptions and well-drawn illustrations of the General's findings in southern England. After his death, however, standards of both excavation and publication fell sadly, not even the General's own staff managing to keep up to his mark. The Research Report series of the Society of Antiquaries of London, beginning in 1913 with sites like Richborough and Wroxeter, were the best the time allowed. In 1909 began the splendid inventories of the Royal Commissions on Historical Monuments, which progressed through the English, Welsh and Scottish counties at the rate of 58 volumes in 71 years, recording the archaeological monuments and historic buildings, in town and country, up to mid-19th century in date.

Standards of excavation and publication were not of the best in the 1920s and 1930s; H. St George Gray in 1929 called for better communication between archaeological societies and also suggested some needed improvements in all departments of local society printing, distribution, and indexing. In 1931 the Congress of Archaeological Societies suggested some minimum standards for publication, and modest indeed they were. It took the advent of Wheeler to inject the necessary stimulus: he arrived in due course at a reporting scheme not too different from that commonly accepted (if not always followed) today (Wheeler, 1956: 216). *Maiden Castle,* of course, is a well-known 'salvage of the report that should have been' (Wheeler, 1943: Dedication), and gives anguish and exasperation to every archaeologist who has ever tried to find out exactly what came from where on that site.

Not until after World War II did the need arise for another monograph series, mainly for excavations on monuments in Ministry of Works care but including wartime rescue work in addition. The ensuing reports were far too large for any journal, hence the fat green volumes. Jarlshof was the first (Hamilton, 1956) followed by a volume every two years until 1962; two volumes followed in 1968, but an eight-year gap presaged the slowing down of publication in this series, until volumes were taking as long as 10 years to emerge from HMSO. The government printing house was not only cramped by old-fashioned practices ('no publisher known to us is more given to restrictive practices or less willing to consider changing his ways'—Elton, 1980) but was giving archaeology very low priority. Hence, although these volumes looked quite handsome, and sometimes used expensive processes like collotype (Piggott, 1962), the last few were already historical documents when they emerged.

The 'Cranborne Chase tradition'

Bearing in mind the powerful place of Pitt Rivers in the development of British archaeology, it can come as no surprise to hear archaeologists today discussing 'the

Cranborne Chase tradition' of publishing (cf. Alcock, 1977–8). This shorthand phrase refers principally to the General's habit of providing full accounts of his observations, voluminous 'relic tables' relating the finds to the features in which they occurred, and careful drawings of virtually every section and artefact. As is well known, these records have been re-interpreted in modern times, notably by Hawkes *et al.* in a famous paper of 1947; and whatever problems remain over Pitt Rivers's failures of observation or record (cf. Barrett and Bradley, 1978) there is embedded in the national archaeological consciousness the feeling that 'the Cranborne Chase tradition' is still the proper, the *moral* way to publish. In addition to the high standard of scholarly content implied by that tradition there is also a certain aura of elegance about its publications; for up to World War II, and surprisingly far beyond it, printing and paper remained cheap enough for most monograph publications to attain to standards of appearance which even the General might have approved.

Many archaeologists are still emotionally attached to such standards even now when it is no longer possible to afford them. (Indeed, the emotional attachment is even claimed as a rational one by its adherents, in spite of evidence that not even full publication can guarantee credibility, and in spite of impossibly rising production costs.) None the less, even if we have now to abandon the Cranborne Chase tradition in its two aspects of full publication and elegance of appearance, it would be a grave disservice to archaeology if we were also to lose for ever that aspect of Pitt Rivers's heritage which encouraged accuracy, clarity of illustration, and pellucid writing – those traits of the classically trained archaeologist which seem sadly beyond the capabilities of most of today's practitioners. Let us hope, indeed, that Hope-Taylor's Yeavering volume (1979), sorrowfully hailed as the last of its kind by Bailey (1980), will continue to provide inspiration and a model of accuracy of content and elegance of verbal and artistic expression.

It should perhaps be noted that none of the monographs here discussed come from 'commercial' publishers in the usual sense of that word. Some publishers (e.g. Duckworth, Academic Press) have produced conference reports and monographs, but we have no equivalent yet to the commercial publishers on the Continent who are so deeply involved in the production of academic theses, excavation reports, and other scholarly works. The Department of the Environment finds itself unable to consider grant-aid to commercial publishers, but shows some signs of unbending as far as university presses are concerned.

Grant-aided publication

By far the largest sums of money to aid archaeological publication come from central government via the Department of the Environment; the other sources are small by comparison. Table 2 shows these sources.

Developments since 1974

Over 30 years ago Atkinson (1946: 178) found it necessary to point out that publication was expensive and costs needed to be kept down. In recent years the twin

Table 2 Sources of grants for archaeological publication in UK

Department of the Environment	75% of costs of printing reports of State-funded excavations. For 1980–1 the total figure was £100,000
British Academy	Small amounts to individual journals: for example, £1,100 in total for year 1976–7
Council for British Archaeology (using funds from British Academy)	£4,500 for 1980, available for approved articles in journals of CBA-affiliated societies
Commercial or public utilities	Such as Mobil; British Gas; Amey Roadstone; Rio Tinto Zinc; GPO
Local authorities and local societies	Extremely variable practice

By 'grants' I mean monies paid outright, without expectation of return; some organisations invest in publications but would at least theoretically be repaid by sales.

problems of expense and speed have become very urgent, and have induced the rise of the typewriter-set, offset-litho printed volume with paper covers. Foremost among this style of monograph, if only for sheer numbers and ubiquity, is the British Archaeological Report series, founded in 1974 by three energetic amateur archaeologists in Oxford. They were able to command a working capital of the order of £40,000 for setting up the series, and they had in Oxford a plentiful supply of typists to produce the camera-ready copy and of students to collate and pack the publications. Theses and conference proceedings form the majority of their titles, but a number of excavation reports have also appeared in the familiar blue paper covers which are now to be found, along with the companion red series for non-British material, on the bookshelves of every serious archaeologist, professional and amateur (Thomas, 1980). No less than 160 volumes have appeared within six years, and while many people grumble about the slack editorial control, rough production, and ever-increasing cost, there is no doubt that BAR is by far the bulkiest component of the British archaeological scene, and every young author hopes to appear in it.

Similar pressures impelled the British Museum to begin producing a series of Occasional Papers, also from camera-ready copy; regrettably for such an august institution these too are not very well edited or produced, but some 20 have appeared in a relatively short time.

In about 1975, at the same time as BAR was establishing itself, the CBA was revitalising its own publications programme. A good modern design was commissioned for our Research Report series, set in double columns in A4 format to give the largest possible number of words per page, and within the last five years some 20 reports have appeared, to high standards of editing and production. They are mostly papers from conferences, but some excavation reports and a special-subject bibliography have appeared, and the series has received general approval.

In addition to these three major series, there are numerous much smaller ones which have been set up in recent years to fulfil the publishing needs of the professional

archaeological units. Among these are the York, Lincoln and Colchester Archaeological Trusts (respectively).

In addition there are series like *East Anglian Archaeology,* covering the work of the Norfolk and Suffolk units, and soon to embrace Mucking as well; the CRAAGS series for the unit based on the Bristol area; the Welsh archaeological trusts' publications; and several others. Some units use professional book designers and produce a very handsome result, while others publish more informally from typescript; but collectively the 'unit monographs' are making a notable contribution to British archaeology. (They are also changing the balance of publication away from the county journals: see p. 102 below.)

The existence of so many monograph series, many of them of fundamental importance, exacerbates the problems of production costs in that the market to buy such publications is strictly finite and is already being deluged by publicity leaflets either tempting or scruffy. Of course, the problems of costs and marketing are not confined to archaeology: all academic publishers are up against the hard facts of short production runs, ever-rising costs, and slow returns on investment (Meadows, 1977; also Ingram, 1976; *Times Higher Education Supplement,* editorial and correspondence, 11 July 1975; Mann, 1980). Archaeologists who have been spoilt for years by amateur publishers who charged only unit cost or a little above it have bitterly resented attempts to charge even a modest two-and-a-half times unit cost (the typical CBA mark-up; compare the typical commercial publisher's mark-up of at least six times unit cost). Reducing the selling price does not boost sales as much as hoped, and merely lowers the chances of recouping the outlay before inflation has taken its toll. Reducing the print run lowers the total outlay but increases the unit cost and therefore the selling cost. There is no simple answer: and the difficulty in selling short-run specialist works has forced the CBA to shift its publishing programme somewhat towards more readily saleable practical handbooks bringing a faster return on capital invested.

It is instructive to look a little more closely at book price rises in archaeology as compared with other disciplines. Table 3 shows that the average cost of academic books in general has nearly doubled since 1975, whereas the figure for archaeological works is only about 50% up. Similarly, while many fewer books now come into the low-priced category, archaeology has fared rather better than the other subjects.

Similarly the periodicals in our subject appear to have fared better than the general average (*Library Association Record,* 82, 1980, 220–1; see also Urquhart, 1978).

Even so, the relatively favoured position of archaeology cannot disguise the fact that the £50 book is becoming quite common, and prices can range up to £135 for a two-volume catalogue (Eames, 1980). It must be a matter for very great concern that individuals can no longer keep a good personal library, and even institutional libraries are having difficulties in finding the money for books. Periodicals too are suffering as not only individuals but also institutions have to withdraw from subscribing.

Much of the increase is due to the steep rise in printing costs (64% since the end of 1975 and still rising – British Printing Industries Federation figure quoted in *The Bookseller,* 8 September 1979); but of course all publishing overheads have increased markedly

Table 3A Rise in prices of academic level books (all subjects)

Year	Average cost of academic books in UK	Proportion of books costing £8 and below (%)
1975	£5.57	80
1979	£10.81	47

Source: *Times Higher Education Supplement*, 13 June 1980, quoting figures obtained by Centre for Library and Information Management (CLAIM) at Loughborough University.

Table 3B Rise in prices of books on British archaeology

1975	£6.08	79
1979	£9.32	57

Source: 1975 figures taken from CBA's *Archaeological Bibliography* and based on 127 titles; 1979 figures from CBA's *British Archaeological Abstracts* and based on 159 titles. The 1979 figures will be slightly weighted towards the more expensive titles because *Abstracts* selects the more significant works for treatment. Inflation is not taken into account because the comparison is essentially between price rises of general academic *v.* British archaeological works.

in recent years (Ingram, 1976), and inducing the public to pay any kind of realistic price is proving very difficult for all publishers (Campbell, 1980). The problems of learned societies engaged in publishing (including some archaeological ones) were surveyed by Embling (1976) and a few palliative measures were suggested, such as centralised distribution services, postal concessions and the like. More recently disquiet has been expressed (Royal Society, 1981) about the whole system of funding scientific publication in the UK.

Conscious of problems like this the CBA issued in 1976 a booklet of advice for editors and treasurers of archaeological societies on how to cut unnecessary costs in publication and how to establish proper costing and marketing procedures. *Signposts for archaeological publication* proved very successful and continues to sell in a second, revised edition. Many of the larger archaeological bodies, initially slow to respond to the changed conditions, are also beginning to revise their policies, and few of them would now subscribe to the recently expressed view that these are 'passing problems of an ersatz age' (Stell, 1979). For instance, the Society of Antiquaries of London has re-introduced its Occasional Papers series for works needing cheaper and faster publication; and even the Royal Commission on Historical Monuments (England) has announced its intention to diversify still further from its massive, detailed tomes towards paperbacked volumes on specific, selective, usually urgent themes (Fowler, 1980). Moreover the Department of the Environment managed, in 1979, to whip HMSO into bringing out the Gussage All Saints report

not only in a new, economical format closely modelled on that of the CBA, but at exemplary speed (Wainwright, 1979). We may doubt whether either excavators or HMSO will achieve the five to six monographs a year asked for in the Frere report (Frere *et al.*, 1975; para. 5.4).

A possible solution to the problems of learned societies that has sometimes been canvassed is the establishment of editorial processing centres – EPCs – which are offices where all editing, preparation for print, print-buying, and distribution can be done for a number of societies (Woodward, 1976). Even if the societies could be induced to co-operate in this way, however, it soon becomes clear that the costs of such centres are prohibitive: they need both space and staff, whereas most archaeological societies run almost entirely on voluntary labour and concealed costs (e.g. by using members' garages and boxrooms for storage, distributing journals by hand, and so on).

(Just as this paper was nearing completion there appeared an analysis by Ezra Zubrow (1981) of shifts in American patterns of archaeological publishing which differ slightly from what we are seeing in Britain: while fewer publishers are engaging in the production of books of national importance, local publishers of site reports and other data are springing up everywhere. The average price of archaeology books has nearly tripled in 10 years even though it now lags behind other technical books; he relates this figure interestingly to university teaching salaries.)

Preparing the text for publication – 'post-excavation work'

So much for the general background to British archaeological publishing, and for the problems attached to seeing a text into circulation. Now, to go back one step, what about the difficulties of preparing that text from the raw mass of excavated or collected data? Everyone knows how pitiful has been our response to the massive destruction of archaeological sites; but the pace of publishing what we have excavated has lagged even further behind. In 1974 Peter Addyman shocked us into a realisation of the extent of the backlog of unpublished excavations (Fig. 1); and it seems that in 1981 no one even has a ready means of calculating how many more excavations have been done in the intervening nine years and which of them have been reported.

It is no great secret how this came about. Up until the 1960s or so excavations were nearly always relatively modest affairs which were not beyond the power of one person to write up. A few specialist reports might be incorporated, usually a simple list of bone identifications, a report on special items of metalwork, perhaps some pollen analysis – little more. Even so, many excavators were failing to write their reports. For one thing it was easier to go on digging (especially when there were far too few excavators to respond to the threats anyway – Noël Hume (1978) tells a graphic story of attempts to rescue the City of London's evidence). For another, some excavators had to continue digging as their only means of livelihood. Moreover, 'even experienced archaeological writers can be too scared of a mass of complex material to face up to the problem of studying it, selecting from it, organising it, and turning it into a usable and readable form' (Addyman, 1973). Cemetery excavations are peculiarly difficult: eight years to publish one is considered as

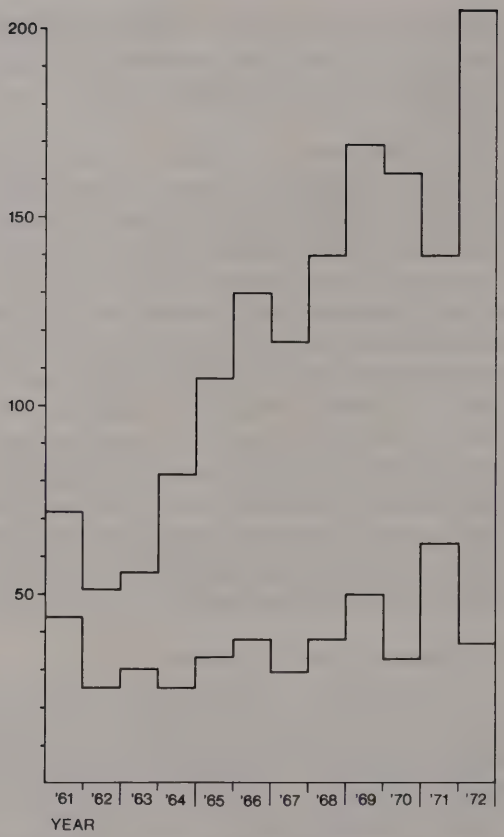

Fig. 1 Arrears of publication of excavations: upper = number of excavations, lower = number of reports. (Redrawn from Addyman, 1974.)

'a minimum of delay' (Hawkes, S.C., 1980) while Tania Dickinson (1980: 16) found that only 19% of Anglo-Saxon cemetery excavations 1956–77 had received any degree of publication, and S. Hirst (1980: 240–1) points up some of the time-consuming activities concomitant upon publishing graves.

Even the archaeologist who could surmount all these problems was not always being helped to do so. For instance, it has taken years to persuade the Department of the Environment to provide their excavators with the time and assistance needed to write up their reports. (This is not a problem unique to archaeology: Western society in general is said to allocate dollars for research but only cents for publication (Borko and Bernier, 1975: 151).) In general archaeologists were expected to work alone, perhaps with some drawing office help, in their free time after a day's work; the daily fee paid during excavation was meant to cover the writing-up period as well. In such circumstances how could publishing fail to lag?

Gradually, however, the situation improved, and I am indebted to Sarnia Butcher of the Directorate (formerly Inspectorate) of Ancient Monuments and Historic Buildings for researching this paragraph and the next. It appears that the first official help to excavators came in 1957 when a fee was paid on completion of the report. In 1962 it was accepted that further assistance must be given; at first this came in the form of payment for site assistants to process the finds, the provision of premises in which excavators could work on their finds, and the expansion of ancillary services such as the Ancient Monuments Laboratory and the Archaeological Illustrators' section. In 1968 the Inspectorate's archaeological workrooms in central London were opened; fees were paid to excavators while working there on their reports.

In the late 1950s and increasingly during the 1960s excavation was carried out by independent committees; grants to these included funds for post-excavation work. When full-time excavators were appointed as Assistant Inspectors (i.e. within the Civil Service) in about 1961 it was recognised that half their time must be spent in writing up their work and the same principle was followed when excavation units with full-time archaeological staff were formed in various towns and regions during the early 1970s. In 1973 a separate Post-Excavation and Publication section was established within the Inspectorate whose duties included responsibility for the funding of this work. Circulars to excavators urge the need for good quality reporting and steady progress in it (e.g. Department of the Environment, 1978, 1980); and a new push for completion of pre-1973 excavations has recently begun (Department of the Environment, 1981).

There is, then, a new determination to see that public expenditure on excavations is recompensed by proper arrangements for publication. The University of Leicester runs a graduate course on post-excavation studies (Megaw, 1980: 86) which started in 1978 with central government support. And although the Department of the Environment showed a remarkable reluctance to fund the post-excavation work at Mucking (a site of European importance) at all, let alone at a proper scale, work is now proceeding there at a rate intended to yield the full archive report by 1982, five years after digging ceased. (Margaret Jones has kindly supplied me with the following statistics to indicate the scale of post-excavation work required to follow over 10 years of all-year-round digging: the Mucking unit now has seven to eight archaeologists plus about 10 part-timers and a microcomputer; 15 hectares were dug producing 33,000 pages of field notebooks, over 5,000 large boxes of finds, over 10,000 working drawings, 25,000 flints from 8,000 contexts, 12,000 charcoal identifications, and so on.) The City of London excavations, with millions of finds from 50,000 contexts, will take 10–15 years to reach archive report stage (Schofield, 1979).

The outlets under strain

It is immediately apparent, of course, that however great the problems of preparing such reports for publication, finding a vehicle for publishing them presents a whole new crop of difficulties. Philip Rahtz set these out in 1974: there is much more detail than in

the old-style excavation report; there are more specialist reports and they are more detailed; more excavation has been done without a corresponding increase in publication outlets (though that is far less true in 1981 than it was in 1974); the results are more unreadable for the layman; and the cost of print is rising too fast. Rahtz points to the paradox that small, trivial excavations more readily achieve publication than do large, complex and important ones. Similarly one can find a publisher for a brief synthetic report of a large excavation; the problem comes with the full, exhaustive report of that excavation. Such massive reports, if published as monographs, almost inevitably make a loss, something which no organisation, commercial or not, can nowadays bear with equanimity.

Traditionally, excavation reports would find a publisher either with the county journal or with a national one, depending on the site's importance. In recent years however the county journals have been noticeably, even catastrophically, losing their importance in the archaeological scene, either because they are refusing to take the more detailed and lengthy reports or because newly established monograph series are taking the most important work. In fairness to the county societies (although some of them have failed to face squarely enough the totally changed conditions of modern archaeology and modern publishing) it must be said that their membership consists mostly of lay people who, although keen on archaeology, are not so keen that they are prepared to let their subscriptions be used for page after page of pottery drawings, post-hole descriptions, and tables of environmental material that might as well be so many laundry lists (to borrow Caroline Grigson's telling phrase – Grigson, 1980). Why should the ordinary society member – or indeed the busy rescue excavator, museum curator, or evening class teacher – be expected to wade through this material? There are very few specialists who will 'read every page critically, and study every illustration intently' (Mitchell, 1980: 12).

By 1974, then, the whole publication system was under strain because it was unable to accept 'Cranborne Chase tradition' publications at these new levels of complexity and intensity; the total record had become too expensive to print or to buy. Another answer had to be found.

The Frere solution

The government-sponsored Working Party led by Professor Frere produced a suggested solution to the cost problem. They identified four levels of information in archaeological research (Table 4).

The Working Party recognised that it was no longer possible to publish the full data from an excavation (Level III) and recommended instead that the information be published at one further remove, Level IV. The excavator would still have to write his full report at Level III and deposit it in a suitable archive where microform or Xerox copies would be available on request to interested specialists. However, the excavator would then have to make a short version for conventional publication (Level IV).

The concept of Level IV, although newly defined in this form, has in fact long

Table 4 Frere 'levels' (source: Frere *et al.*, 1975: Appendix I)

	Data		
Level	Site description	Loose material	Availability
I	The site itself and general notes, old letters, previous accounts, etc.	Excavated finds	Storage in museums
II	Site notebooks, recording forms, drawings, sound-recorded tapes	Finds records, X-rays, photographs, negatives, colours transparencies	Available for inspection at museum or regional or national archive
III	Full illustration and description of all structural and stratigraphical relationships	Classified finds lists and finds drawings, and all specialist analyses	Publication in journal or occasional papers, as required, or available as duplicates, microfiche, microfilm or computer printout
IV	Synthesised descriptions with supporting data	Selected finds and specialist reports relevant to synthesis	Publication in multiple copies

formed part of our publication tradition: a random sample would include W. F. Grimes' *The excavation of Roman and medieval London* (1968), Leslie Alcock's *By South Cadbury is that Camelot . . .* (1972), and Richard Atkinson's *Stonehenge* (1956). A newer example is Roger Mercer's *Hambledon Hill: a Neolithic landscape* (1980). All these give some technical details and drawings to support their claims, and provide plenty of interest and information for the general public, but only whet the specialist's appetite for the details that he requires. Some excavators probably find it useful to publish at this general level to help clear their minds for the more difficult task of preparing the full report. However, there is also a type of publication which could be defined as Level V, a really popular-level booklet aimed principally (and why not?) at winning money from people with only the most casual interest in archaeology.

What I would suggest we are mainly finding in print now is something best defined as Level III½, because it contains too much detail for general purposes but not enough to satisfy the specialist. It is an uneasy compromise.

In any case the real problem about Level IV is that no two people agree on what it should be. It will need to be assessed differently for each individual site in any case. The Frere report defines it thus:

> The minimum acceptable standard of publication of an excavation report continues to be a full presentation of the history and significance of the site together with full documentation and evidence for all statements made, and publication of all necessarily relevant materials such as selected pottery and small finds in their contexts (Frere *et al.*, 1975: para. 2.9).

There seems to be enough material there for at least three examination questions! Certainly, six years later, experiments in interpreting this statement are still in progress (e.g. May, 1978). The principal difficulty is that people who read a synthetic statement need to know the full data supporting it so that they can test the interpretation. A new attempt to decide how to select for Level IV is to be made by a joint effort of Department of Environment and CBA to produce a 'post-Frere report'. In the meantime we have John Schofield's (1979) thoughtful discussion of this problem to ponder for ourselves.

Somewhat wryly one can recall that once again Pitt Rivers was here before us: 'The records . . . are here given in such detail, that no point of evidence will remain doubtful, to those who take the trouble of wading through the tables, drawings and descriptions, that are given in the volume; whilst those who require only a narrative of the excavations, with the results, will find them in the general account' (Pitt Rivers, 1892: xiii). However, he had the luxury now denied to us of being able to provide both levels within one set of covers. It might none the less be worth analysing for modern purposes just how he made the division.

Archive control

The role of the Ancient Monuments Inspectorate will be crucial in the way excavation reports now develop: they are already having to keep a watch on plans for, and progress on, excavation reports in order to keep publication grants to a minimum. Excavators are now required to submit synopses for approval, and some fairly detailed specifications for reporting have been laid down (Department of the Environment, 1978, 1980). Even so, the way that Level IV works out in practice will matter rather less if, as Renfrew (1980: 295) suggests, the quality of the Level III archive report is subjected to rigorous control. We must avoid the situation fearsomely warned against in a recent French conference, where the researcher is seen as 'noyant dans un flot désordonné d'informations et de pseudo-informations déversées pêle-mêle' (*Nouvelles de l'Archéologie,* 3, 1980, 55). It seems vital that all archive material be refereed, as for any normal publication, before being deposited (whether the repository is a national archive or an appropriate local museum). There has already been some complaint about the manner of animal bone reporting at archive level, and some recommendations are being drafted by the CBA's Archaeological Science Committee. But recommendations of this kind must have mandatory force, and someone must oversee them, especially in view of the diversity of repositories in use. (In this connection see in particular Thomas, N. (1976) on the role of the museum as repository; see also Rhodes (1980) and references therein.) In addition, of course, the copyright of all the authors, whether excavators or specialist contributors, must be protected in the same way as for unpublished theses, by a declaration signed by anyone consulting the archive.

Post-Frere experiments

The appearance of the Frere Report led to a number of experiments in text-shortening. Platt (1974) had proposed that the excavator prepare a rapid summary of his

findings, with select plans and sections, within a year of completing excavations! Complex stratigraphic sequences have been presented by Carver (1979) in semi-realistic graphics, and by others in the purely formalised layout of the Harris Matrix (Harris, 1979) which was originally devised as an aid to site recording, though its help in communicating findings is evident. Miles (1980: 62) called for a flexible approach, saying that archaeologists 'must decide what they need from excavation reports', while Rhodes (1979a, 1980) has made a number of interesting suggestions on the publication of finds records, and the working party on Romano-British pottery reporting (Young, 1980) has issued some guidance on how to select significant pottery for Level IV treatment.

But what are we publishing for?

One excavator, Leslie Alcock, was dissatisfied with the Frere Report on the grounds that it did not examine deeply enough the intellectual reasons for publication. In an extremely important paper which should be deeply pondered by every excavator, Alcock (1977–8) said that an excavator's record is no more than his record: 'In simple logic we can never know what (he) has failed to recognise, or what he fails to tell us about', nor can we assess his skill from his report, though we may be able to judge his theoretical and methodological approach. Re-interpretations of old excavation reports, such as Hawkes *et al.* (1947) were able to make for some of Pitt Rivers's Cranborne Chase work, are not only rare but are confined to sites with simple stratification. The purpose of publication, Alcock therefore concludes, is mainly to convey information, and that should be done for the best convenience of the (extremely busy) reader. The 'Cranborne Chase' style report should still be written, as carefully as if it were for publication, and it is this which should constitute the Level III archive material, and be available in microfiche or Xerox form on demand. (Certainly the Frere Report rather hurries over this point, but it does say that archive deposit 'demands from the excavator a high standard of preparation of Level III data, *equal to that required for publication itself* (my italics) (Frere *et al.*, 1975: 3). Alcock's point that it is the reader's time that must be saved is an important one and could with advantage be used as a guiding principle for all Level IV printed reports, which Alcock envisages as comprising a page in a county journal for a minor site or 40,000–50,000 words with 100–120 figures and plates in a hard-cover series for a major site. The local museum curator, the harassed rescue excavator, or the part-time archaeologist can skim such reports quickly for what will interest and profit them. Alcock's paper, which has generated a very proper amount of interest, is important because it shows exactly why we publish excavation reports; and once we know *why* we are rather closer to finding out *how* to publish them. They must be designed for 'skimmability', which means intelligent ordering, clear layout, and helpful typography.

While on the subject of logical presentation of reports, I should mention a recent work of J.-C. Gardin (1980) which has received considerable attention in France. It is, however, a very difficult work to follow, even in English – it is best described as highly structured cobwebs – and it is doubtful whether the ordinary excavator, field surveyor or

museum worker will be able to use it as a guide, or would even want to in view of the practicality and clarity of Leslie Alcock's paper. None the less it is to be hoped that people will read the Gardin book for its insistence on logical progression in archaeological analysis, even if some of its examples strike a British archaeologist rather quaintly.

Finally, in this section, any excavator who believes that he is digging up *information* should read Pryor (1980).

Text-fiche as a solution to the financial problem

The solution currently favoured by many archaeologists is the 'text-fiche', in which the normally printed synthetic report at Level IV (however that is defined) is accompanied *at the time of publication* by a set of microfiches containing all the Level III data photographed from typescript. These will comprise detailed feature records, pit-groups, bone data, flint statistics, common pottery catalogues, etc. Microfiches are much cheaper to produce than printed texts (one fiche containing 98 pages costs about the same currently as two pages of conventional print) and they also save space and postage. Probably the best statement in print about the virtues of text-fiche is that of A. E. Brown (1980), although various types of microfiche assistance have been considered by, for instance, Barker (1977: 245), Mytum (1978), Thompson, (1978) and Hinton (1979), though Schofield (1979) is more useful than all these, and Rahtz (1980) should certainly be consulted.

Two of our county journals were first in the field with almost simultaneous issue of text-fiche reports – *Northamptonshire Archaeology* and *Research Volumes of Surrey Archaeological Society,* both in 1980. Several more have joined them since then, and the first *Britannia* monograph (Neal, 1981) contains a microfiche set of colour illustrations of Romano-British mosaics. The CBA had already announced its intention to do a text-fiche publication on behalf of the Oxfordshire unit (Cleere, 1979). Obviously there has to be a very precise means of indicating within the printed text exactly what is on the fiche, and exactly where it is; contents pages will have to be drawn up much more carefully than they usually are, if only because fiche pages are so much more difficult to scan than printed ones. There is a clear case here for agreed standards to be drawn up: another task for a CBA–DoE team?

There is, not surprisingly, some consumer resistance to the whole idea of microfiche: the 'learned professions inclined to take pride in their mechanical ineptitude' (Bell, 1980) evidently do not exclude archaeologists. There are also potential technical problems such as accuracy of drawings produced on microfiche reader-printers, and the permanency of the image on the fiche (e.g. Spaulding, 1978). But pragmatism will have to win: there simply is no other financially feasible course open to us now. Microfiche readers are becoming cheaper and more readily available; repair garages and bookshops alike are acquiring them, and a usable reader costs less than some people spend on their fancy camera lenses. Undoubtedly there are problems about comparing data between fiches; even two double-fiche readers would not suffice in some instances, and microfiche print-outs can be difficult to obtain. None the less, even those archaeologists who read

excavation reports in the train, in the bath, or in bed may soon be catered for by improved quality portable readers now that the microfiche trickle is becoming a flood. (On microform generally see Ashby and Campbell, 1979.)

Perhaps a more serious problem is that of the specialist adviser: his lengthy report on the mollusca, or pottery temper, or slags will not now be conventionally printed and he may feel cheated of his priority publication. Extra care will be needed to avoid alienating these specialists who contribute so vitally to our excavation reports and museum studies (Dimbleby, 1978; Verhaeghe, 1979: 79); perhaps they should *all* receive a summary in the printed text, so that no one appears to have been 'relegated to fiche'. Specialists should appreciate the advantage that second editions incorporating fresh knowledge can be rapidly prepared and cheaply disseminated by microfiche (Craddock, 1980: 384). Perhaps the biggest advantage of text-fiche is that the printed text can contain the most attractive material and win far more sales than the average report; meantime no scholarly integrity is compromised, since all the evidence is available. Better sales and increased flow of information – how could one ask more?

For a brief survey of the impact of microfiche on the literature of ecology, see May and May (1976). Line and Williams (1976) treat the more general question of alternatives to conventional publication, such as synoptic journals and hard-copy abstracts backed by full-text microforms. Manten (1980) discusses the advantages and drawbacks of publishing synopses only of primary scholarly information; see also Millson (1979). 'Electronic journals' in which papers are not printed at all but held on computer and read on a VDU (visual display unit) seem unlikely as an option for archaeology, if indeed any disciplines choose this course (Redfearn, 1980).

What should the new style of report contain?

There is fairly wide agreement that the best layout for a report, at whatever level, is that suggested by Rahtz (1974); moreover Rahtz has recently (1980) produced a written discussion of the use of text-fiche. Individual excavators should study both these and should also look in detail at the text-fiche reports that have already appeared in *Northamptonshire Archaeology*, **14**; *Research Volumes of Surrey Archaeological Society*, 7; *Oxoniensia*, **45**; *Somerset Levels Papers*, 7; *Somerset Archaeology & Natural History*, **124**. Make sure that every part of your report is well sign-posted and cross-referenced; every reader is in a hurry and needs your help to find his way rapidly around your material. A good meaty abstract of 200 or 250 words, placed at the head of your article, will make an excellent start, but make sure you deliver what it promises. Separate evidence from interpretation; and finally, remember that your job, as Alcock (1977–8) advises, is to say what information you are making available and where it can be found, whether in 'hard print', microfiche adjunct, or backing archive.

Secondary services – bibliographic tools and their functioning

No excavation report or museum catalogue can be written *in vacuo*; it must take account of other work on the subject. British archaeology is a small world, and until

about 20 years ago it was possible to know personally most of the workers in one's own field, and to be on nodding terms with the rest. In other words the 'invisible college' looked after most needs. To a considerable degree it still works like that today; there are small circles of scholars who decide what the British Bronze Age looks like this year, or what to do about hillforts, or post-medieval kilns, or Roman coins; they keep in touch by regular meetings or informal newsletters. For general purposes, however, it has long been impossible to keep up with the literature, those 250 journals and over 30 monograph series for British archaeology alone.

The CBA's Archaeological Bibliography

Hence we have long had some kind of bibliographic tool to enable people to learn about work being done in these islands. Various heroic individuals, especially the Gomme family and Alexander Keiller, made efforts to provide indexes of a sort to the archaeological literature between 1888 and 1939, but these were crude by today's standards and discontinuous in any case. It was only after World War II, when the CBA was formed from the old Congress of Archaeological Societies and given a permanent staff, that a systematic attempt to cover the UK and Ireland was started. The annual *Archaeological Bibliography* (originally entitled *Archaeological Bulletin*) has been appearing ever since, but with regular crises because it has always had to depend on part-time compilers who give immense amounts of painstaking time for very small recompense. It is a clumsy document to consult, and after 40 years it is in great need of a cumulative index (which would cost the kind of sums that only a fairy godmother could contemplate with equanimity: even pre-editing it and entering it into computer could approach five figures).

None the less, it is better to look through 40 volumes of the *Bibliography* than several thousand separate issues of journals, and the researchers who do use it place great reliance on it.

The *Bibliography* indexes all the small finds mentioned in publications so that one can look up all the square-headed brooches, or all the Beaker burials, or the microliths from Wales. All printed publications originating within our shores are covered, though books are dealt with rather summarily, and works like museum catalogues will not be very deeply indexed as a rule. In general however the *Bibliography* is one of the most detailed indexes in the world, and it also provides us with a useful guide to the general rise in quantity of archaeological publication. Fig. 2 gives average yearly totals of items published; these have been averaged over each block of five years so as to minimise any irregularities in collection arising from changes in editor, lack of availability of materials, etc. The drop in publication totals in the 1960s is not fully understood; it may relate to the period when many archaeologists were so busy snatching material from the jaws of bulldozers that writing-up had reached a nadir, but only a close analysis of the publications themselves could confirm or deny that hypothesis. The dramatic rise in numbers of publications after 1974 is in any case very obvious.

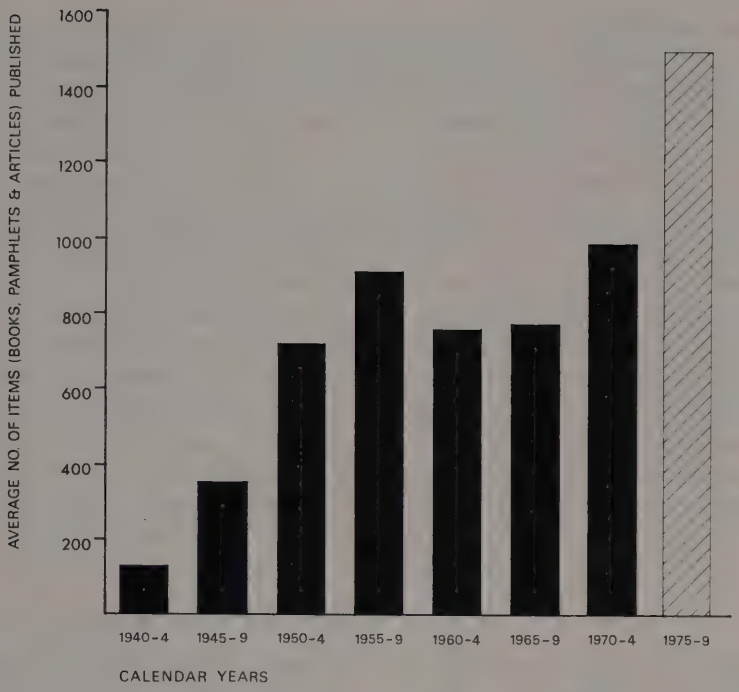

Fig. 2 **Rise in publications in British archaeology 1940–80. Yearly averages (taken over five-year blocks). Figures from CBA's *Archaeological Bibliography*.**

The CBA's British Archaeological Abstracts

Because of its detail the *Bibliography* takes a long time to compile and is always at least a couple of years behind the works it indexes. Archaeologists had expressed a need for something more rapidly available (e.g. Hawkes, 1964), and in 1968 the CBA began to publish *British Archaeological Abstracts* as a current awareness service, for which an extra post on CBA staff was sanctioned by the British Academy. The Abstracts service is highly selective, leaving out the less important papers, but even so is currently including 800 articles and books a year (over three times the figure for its first year of operation). Fig. 3 reflects the same dramatic increase as is seen in the Bibliography graph. The slight drop in 1979 was only a temporary effect, and the service is already under great pressure so that any further increase in publication totals is viewed with dismay. Abstracts is essentially a single-handed operation, with a few stalwart volunteers providing up to one-eighth of the total number of abstracts.

Abstracts searches more widely than the Bibliography, and includes theoretical material from the principal North American journals together with theoretical and factual articles from French, German, Dutch, and Scandinavian journals which have relevance to

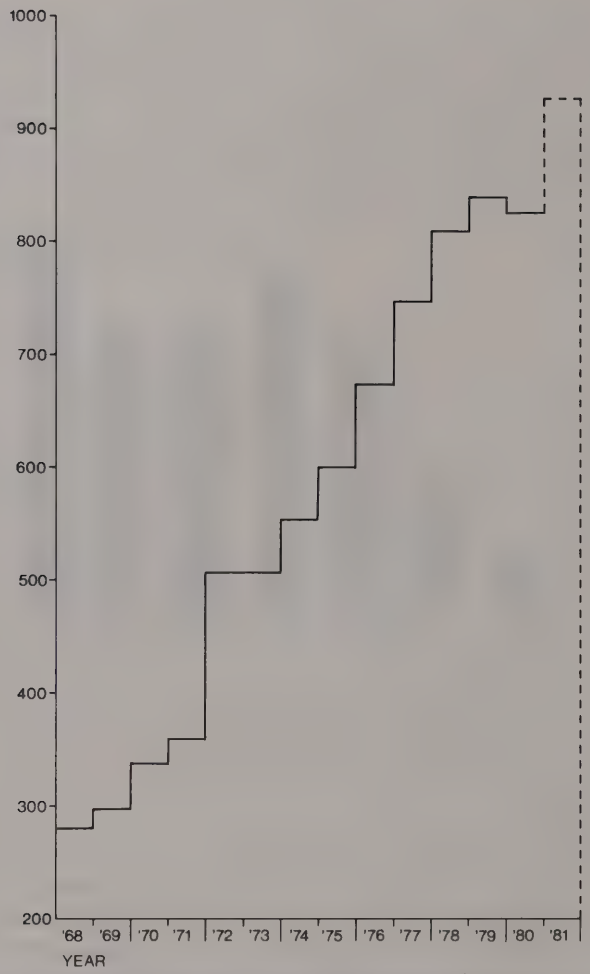

Fig. 3 *British Archaeological Abstracts.* Yearly totals of items abstracted; 1981 figure estimated.

British archaeology. A typical Abstracts issue recently included 297 articles from British journals, 79 from foreign journals, 99 fairly straightforward monographs, and 10 large conference volumes of up to 40 papers each. (The increase of conference publications is one of the significant, and not entirely welcome, phenomena of recent years; greater selectivity, both of conferences to be published and of papers to be immortalised, would not come amiss.)

No abstracts service (except possibly those in highly competitive industrial fields) can make a profit because preparation costs are so high that they cannot possibly be passed on to the subscriber. Strictly speaking the CBA service should be charged at £76 per year

rather than the £9 actually asked of individual subscribers; it is therefore the most heavily subsidised of all CBA activities. It is the more comforting to remember that two close imitations of our service – *Polish Archaeological Abstracts* and then *Nordic Archaeological Abstracts* – have appeared in recent years. These make it easier for British archaeologists to follow some of the Continental developments, although the lack of urgency in appearing of both these services (two or more years after the material they cover, as compared with 10 months for *British Archaeological Abstracts*) must give cause for concern in these fast-moving days when a theory can come in and go out inside five years. The European Science Foundation's Archaeology Sub-committee attaches such importance to abstracts that in October 1980 it recommended that all its 18 member-countries should produce them, either nationally or supranationally. Even so, the level of subscriptions to all these services is lower than it should be; many scholars seem remarkably complacent in their attitude to published information, believing that they see all they need to. (Can they honestly pick up an issue of *Abstracts* and find *nothing* in it of novelty and interest to them?) All of us, said Christopher Hawkes (1964), need shorter cuts to information; Ketley (1976) makes the same point in relation to other disciplines than archaeology, as does the Gregynog Seminar report (British Library, 1975).

The future of CBA bibliographical publications

Rising costs have made it necessary for the CBA to re-examine its bibliographical services and for some time we have been trying to find a means of merging our two publications into one comprehensive service (British Library, 1977). The problem is by no means straightforward, as each service has different aims and to some extent a different readership, and any combination must result in a depressed level of service for one or other, if not both readerships. A carefully designed research programme might discover exactly how the present services are used, and what compromises might be accepted; on the other hand, just as n economists are said to produce $n+1$ different economic theories, any dozen archaeologists may well require 13 different styles of information service!

What is crystal clear is that an adequate level of bibliographic control cannot be maintained by less than two full-time staff, and that in particular it is unreasonable to expect the *Bibliography* to go on increasing in size with only one part-time compiler, the valiant Dr Joan Alcock, and her two even more part-time volunteer auxiliaries, John Kenyon and David Yates. A further worry is that we cannot at present even attempt to cover the very important categories of university theses, informal local publications (the 'grey' literature) and the availability of all kinds of sources and resources of valuable information.

Computerisation?

Of course we should like to use computers in our information work, and there remains some hope that we may obtain help to provide an off-line data bank of the kind

run by CNRS for French archaeology, in which broad subject retrospective bibliographies can be provided for a set sum (currently 25 francs for the search plus 0.40F per document listed). International co-operation would help with costs, but would face the problem that each country has a very large amount of parochial archaeological information of little interest to researchers elsewhere; and apart from matters of conservation policy, legislation, and archaeological theory it is by no means easy to select items of international significance for inclusion in such a data bank. Subjects that have very little interest in one decade can assume considerable importance in another, and who can make accurate forecasts of which subjects will grow? (Cf. *Macbeth,* I, vii: 'If you can look into the seeds of time,/And say which grain will grow, and which will not,/Speak then to me . . .')

If the problems of selection could be overcome, these recent figures for computer storage costs might encourage us to look further at the idea of an international archaeological data bank (source, Lewis, 1980: 64, 66):

Table 5A Cost of main memory, %/month per megabyte

1964	22,000
1970	7,000
1975	3,500
1978	2,560
1979	250

Adjusted for RPI, 1965:1979 = 225:1.

Table 5B Average cost per on-line search

1968	$1000
1975	$70
1978	$5.75–$8.50

This may all be pie-in-the-sky as far as British archaeology is concerned, because at the moment the CBA has not even the resources to make available for public consultation its own quite substantial manual data bank of classified abstracts. Moreover, computerised information services are commonly set up after some years of producing magnetic tape primarily for type-setting the printed abstracts service, so that once the computerised version is announced it already has a backlog which is worth searching. If the CBA were to offer a computer search service in, say, 1987, it would have to start putting its material on tape next year. Have we any takers?

Cumulative indexes

I have already said that the *Bibliography* cumulative needs a fairy godmother to fund it; the *Abstracts* cumulative index, all available on slips for each year, has foundered because of the sheer impossibility of making time to merge several hundred thousand slips into a single sequence, so that two successive intended five-year cumulatives have got

stuck somewhere about letter 'G'. In any case I now believe that any available effort should go into the cumulative indexing of the *Bibliography*, simply because it would give complete answers to all questions, whereas *Abstracts* can only give 'most significant' items.

Text-fiche implications for bibliographic services

Will the arrival of text-fiche and similar 'mixed' publications have an effect on our bibliographic services? Probably not, if the synthetic texts in normally printed form indicate in some detail the content of the fiche (or typescript) archive. However, if microfiche 'publications' were to be issued on their own, without a 'head' printed article, they would be extremely hard to keep track of, and I for one devoutly hope this will not happen.

Offprint service

For many years the CBA has issued a regular list of articles available as offprints. The number of journals still able to provide offprints is falling off, however, as costs continue to rise for these expensive hand-worked items; moreover the use of photocopying is almost universal. If the service continues at all, therefore, it will probably become part of the *Newsletter/Calendar*, which has already taken on a semi-bibliographic function, mainly for pamphlets.

Radiocarbon Site Index

Since 1970 the CBA has issued, at irregular intervals, an index to British sites which have been radiocarbon-dated. It gives archaeological sites in classified order, that is, all Bronze Age trackways are gathered together, all hillforts, all Palaeolithic open sites, etc., for ready comparison of dates. It has an alphabetical index to sites and an index of laboratory numbers; it is thus a flexible retrieval tool, and it also contains many more dates than have ever appeared in the official *Radiocarbon* journal. To the best of my knowledge there is no comparably complete and full list anywhere in the world; e.g. the French list in *Bull Soc Préhist Française* gives far less detail.

Archaeological thesaurus

A tool that would greatly improve the efficiency of searching our printed indexes, whether of primary (journal, etc.) or secondary (bibliographic) publications, is the thesaurus. A Utopian ideal would be for all the archaeological journals in the UK (or better still, in Europe!) to use a common thesaurus – a structured vocabulary – so that the searcher could use one single strategy whatever journal he was looking at. Some American journals are already doing this, the primary journals in fact being indexed with

the abstracting journals' thesauri (Dusoulier, 1974: 161). The scheme virtually demands a central indexing system to ensure proper application of the thesaurus. The National Monuments Record (England) has at least the core of an archaeological thesaurus nearly ready, and wide dissemination of this should be instigated, first within UK, and perhaps later by UNESCO or ESF for a multilingual version. We may or may not get our international computerised data bank, but a good start would be the improvement of primary printed indexes in journals (and in monographs).

Future possibilities

Many other bibliographical services could be performed by the CBA if only we had the staff. Chief among these is a handlist of sources and resources which would be of value to archaeologists of all kinds, particularly when they had cause to step a little outside their normal field of interest. The handlist would indicate which institutions held collections of air photographs; which abstracting services were available in other fields (how many archaeologists know of *Fasti Archaeologici*, or *Geo Abstracts*, or *Numismatic Literature*, or the occasionally useful *Science Citation Index* and its *Arts & Humanities* sister?); which dictionaries and atlases of archaeological reference were available, and so on. Another needed tool is a union list of archaeological periodicals: this would list all the periodicals that there are (and have been!) together with the libraries that hold runs of them, so that one could see, for instance, whether Nottingham had a library with a complete run of *World Archaeology*, or whether the holdings of *Archaeologia* in Bristol included the earliest issues.

There is, in short, no lack of ideas within the CBA about useful tools that might be prepared to help the researcher. The only limitation is on staffing and money; and on the number of buyers?

Libraries, information centres, data banks

Libraries

Any consideration of British provision in this field must begin with the Society of Antiquaries of London, whose library founded in 1718 has always striven to be as complete a collection as possible; indeed its total of over 130,000 books and 30,000 prints and drawings may be unrivalled within the whole of Britain and Ireland. None the less the Antiquaries' retrieval system leaves a great deal to be desired: there is a subject index of nearly 600,000 index cards, but it is very selectively compiled and there has never been enough staff effort available to improve its coverage. However, every archaeologist checks through it at some point in his researches. There are as yet no plans to computerise the catalogue, although there now exists a microform version for security purposes only (Hopkins, 1977, and pers. comm.).

Also of national importance is the library of the University of London Institute of Archaeology, geared now to undergraduate as well as graduate teaching, covering many other countries besides Britain, badly underfunded and understaffed, and necessarily

selective in its approach. Its manuscript collections for British archaeology are very small and again its subject catalogue is highly selective and cannot be used for exhaustive retrieval. The Oxford University Institute of Archaeology, for graduates only, has some archive and book material of its own and can also call on the rich resources of the Ashmolean library which (to take just one example) provided 'all but a handful of references in the bibliography' for a recent volume in the *BAR International* series (O'Connor, 1980).

These two examples must serve for other such teaching institutions in the UK.

The county societies, of which there are over 40, often have excellent libraries built up by exchange of publications over a century and more; they obviously concentrate on local material but have much else of value. A few of them, notably Yorkshire, have published catalogues of their holdings, but in general the county societies hold a national resource of unknown size and considerable potential value which really ought to be assessed. The Scots have excellent facilities in Edinburgh, with the National Library, the National Museum of Antiquities of Scotland and the Royal Commission on Ancient and Historical Monuments (Scotland); but again none of these is really organised to answer detailed questions of the sort implied by the term 'data bank'. The Welsh have a copyright deposit library in Aberystwyth, where is also their Royal Commission on Ancient and Historical Monuments, but that is several mountain ranges away from Cardiff which has the National Museum, a university department of archaeology, and the Welsh Office (DoE equivalent). Belfast in Northern Ireland and Dublin in the Republic are in similar case; each has its own riches of information but without the necessary means of retrieving it efficiently.

Many or most of these libraries will supply Xerox copies of printed and manuscript material on request (e.g. Society of Antiquaries of London, 14,000 pieces Xeroxed in 1979 – J. Hopkins, pers. comm.). However, one of the most basic requirements, a union list showing what periodicals are held by which libraries (see p. 114 above) is still lacking; it is a task which could well be undertaken by the CBA, where some of the basic data have already been assembled, if only time and money were available for it.

Information centres and data banks

In that euphoric period towards the end of World War II, when everyone was looking forward to rebuilding all manner of things anew, Sir Cyril Fox made a passionate plea for a National Card Index of archaeological information of all kinds; he visualised a permanent, dynamic organisation with a Director, clerical assistance, an archivist, and a draughtsman (Fox, 1944). According to Christopher Hawkes (Hawkes, C., 1951: 13) 'the whole room rose and cheered him, in sympathy and joy and hope'. A similar plea had been made 10 years earlier (Grimes, 1935); at last in 1981 we have made a little progress.

National Monuments Records

The principal central repositories of data in the UK are the National Monuments Records, one each for England, Wales, and Scotland. For example, the English NMR has

1 million photographs of well over 100,000 buildings, 16,000 drawings of buildings, over ½ million air photographs of archaeological sites (many not yet interpreted), and records relating to ¼ million archaeological sites. The English record also deals with 13,000 enquiries per year, prints 26,000 photographs annually for researchers, and adds 60,000 items to its records annually (Fowler, 1980). It has no detailed subject indexes to archaeological sites, though retrieval of simple categories like 'villa', 'hillfort', etc., is possible. A jacket microfiche system is in use which allows a degree of automatic retrieval by a mechanical coding system. Moreover a collection of copies of excavators' site records is being built up.

The core of the NMRs' archaeological card indexes derives from the Ordnance Survey Archaeology Division. This Division operated for 60 years but is currently being disbanded, to the dismay of every archaeologist in the UK. It cost £700,000 in 1978–9 (Serpell, 1980: Ch. 17) and probably nearly £1 million in its last year of active life. Such figures are not surprising in view of the 55 staff who were engaged in surveying antiquities, updating the card index, and extracting relevant information from published work (Phillips, 1980). Although each National Monuments Record has a copy of the relevant OS card index, none of them yet has the facilities for continuing to maintain it to OS standards, let alone improving it. However, given appropriate staffing, including field surveyors, the NMRs have the potential to produce a record of extremely high quality, far better indeed than the old OS record. It is still not what Fox wanted – it would need all the contents of museums added for that – but it is a very remarkable data bank.

County Sites and Monuments Records (SMRs)

The newest form of data bank in British archaeology is the county-based SMR, of which about 40 are now in existence (RCHM Eng, 1975: App. IV) and all of them are based in the first instance on the OS card index, expanding it from local research as staffing and other resources allow. One of the most advanced, that of the Dyfed Archaeological Trust, is based on a Z80 type microcomputer and currently costs about £7,000 p.a. to run (capital cost £5,000 in 1979). However, this organisation would need two more staff if it were (a) to be able to collect fresh data for the record, (b) to offer a full retrieval service; such an expansion, modest enough at that, would push its costs up to nearer £15,000 p.a.

All these institutions are liable to have computer tapes and microforms deposited with them, and will need to make suitable arrangements for tape refreshment and film renewal. Some generalised levels of costs are given in ACAO (1978) similar to those for Dyfed.

Museums

With a few notable exceptions, museums tend to be the Cinderella organisations of a Cinderella subject, which is at least partly why many of them lost their place in the

rescue side of archaeology. Now they are being asked to accept huge quantities of material dug up, classified and published by some other organisation altogether (Thomas, 1976). Moreover no one is keen to provide the necessary funds for storage and care. It is the more cheering that the Museums Documentation Association is making such good progress on helping museums to catalogue their material so that at least we know what is there. Stewart (1980) has outlined a means of smooth passage of artefacts from dig to museum as the 'well-tempered archive', and an earlier discussion is in Rance (1975). A magisterial survey of museum documentation world-wide has been made by Roberts and Light (1980). (Incidentally, their finding that 'the need for a wide range of entry points to a single record remains a basic problem of museum documentation' (Roberts and Light, 1980: 58) points up exactly the difficulty that the CBA would meet were it to reduce the complexity of its *Bibliography* index.)

Computerised data banks

Special-subject data banks in computer form exist in several UK institutions: for instance the British Museum Research Laboratory holds one on radiocarbon dates, and also has a research collection of references to work on the conservation and analysis of archaeological materials. The Institute of Archaeology is accumulating several data files on various subjects, and the British Museum (Natural History) has one on excavated animal bone. The Ancient Monuments Directorate has its scheduled sites on computer, and so on. Increasingly, individual excavation units are acquiring small computer installations for recording, manipulating, and retrieving their own data. Specialised operations like these make excellent sense, whereas doubts about the advisability of large, centralised, general-purpose data banks have legitimately been expressed by, for instance, Doran (in Doran and Hodson, 1975: 330–2) and by Scollar (1980), although Verhaeghe (1979: 77) seems to be in favour of them. If Euronet-DIANE (see Lustac, 1980) can cater for the chemical, medical, aerospace, and other industries, could it not (the argument would presumably run) also look after archaeology? The main problem would be finance: there is big business in industrial information retrieval but not in archaeology. The second problem would be the parochialism of archaeology (as with the possible computerisation of abstracts mentioned above, p. 112) as compared with the universal needs of (say) chemical engineering.

However, there might be a future for the large archaeological data *base*, a somewhat lesser creature in which the entry of appropriate keywords allows the retrieval of bibliographic references as opposed to full texts with their expensive storage. Even this seems well out of reach without the injection of very large sums of money.

Archaeology and the general public

It is probably becoming a truism to say that archaeological information interests several different types of reader – the specialist in a particular field, the archaeologist

with a general or teaching interest in it, the committed amateur archaeologist, and the tax-paying general public (McGhee, 1979; Dow, 1950: 50). Each of these really needs a different type of presentation; and we must not forget the school child, our future taxpayer. Why is it then that, as Glyn Daniel said in 1948 and could have said just as rightly today, 'To most people today archaeology is still something odd and specialised'? None of our scholarly publishing activity can make sense divorced from the social context which permits it, if not to flourish, at least to lurch on from one crisis to the next; and if we do not spend time in letting the general public, by every means at our disposal, into the secrets of what the television critic Peter Fiddick calls our 'intricately mysterious business', we deserve to have no public funds at all. This final section therefore examines some of the ways archaeologists have used to communicate their work to a wider public.

Site publicity

Sir Mortimer Wheeler, our first (and so far only) great archaeological showman, recognised the value of taking trouble to explain to the general public what the archaeologist was trying to do (Wheeler, 1956: 221–4). Although many archaeologists disapproved at the time, and probably still do, his well-publicised Maiden Castle excavations of the late 1930s attracted coachloads of people. Care was taken to brief the journalists; and every morning the skeletons were tidied ready for the visitors, who responded by putting useful sums in the collecting box. In the late 1960s South Cadbury, and later Dover, ran on somewhat similar lines, and the York Coppergate excavation has a fully developed professional operation designed both to educate the public and to persuade funds out of it. Some archaeologists reject this kind of approach, believing that it leads to superficial and misleading impressions about the whole scope and nature of archaeology; but it seems fairly unlikely that the general public is ever going to understand the subtler manifestations of modern archaeology, and surely it is better to try to get some part of archaeological endeavour across to the taxpayer than not to try at all because of some counsel of unrealistic perfection. Only the informed and active support of the general public will ensure even minimal government funding for archaeology, and we ought to be able now to do better than at Piltdown, where the public 'stared at what they knew not and went away refreshed' (Hillaby, 1972). We should be refreshing the parts that Piltdown did not reach. Of course it takes time, and no excavators have any time to spare; but they are going to have all the time in the world on their hands if they do not succeed in convincing their elected representatives of the value and worth of what they are doing.

Education – books

The process of education must start in the schools, but anyone who has looked at children's library shelves must have seen what a lamentably inaccurate picture is being provided of both our methodology and our results. Our children are being fed archaeological rubbish: there is no other word (see, for instance, Corbishley, 1980). The situation

is improving, very slowly, but it will take years to get all those awful books off the library shelves. Even for adult readers, too few archaeologists are prepared to take trouble to produce readable guides to their results. The need to attract local funds for excavation has forced the production of glossy pamphlets, some of which have been very well written and informative; but there remains a much wider requirement to show what the modern archaeologist is trying to do. Jacquetta Hawkes, a good communicator, shied away from archaeology once the large data tables – the totally incommunicable – started to arrive and made the subject begin to look like a natural science instead of the humanistic one she believed in (Hawkes, J., 1968), and this points up the importance of the synthetic, Level IV presentation recommended in the Frere report.

Surprisingly, general publishers have taken a long time to observe and exploit the public interest in archaeology. Before the war in the UK only the Methuen series of county archaeologies was available, and these were for the reader already strongly interested in archaeology. A few of the more colourful topics like Ur and Egypt were of course ever popular, but it was only after World War II that Thames and Hudson launched a whole series of books, called *Ancient Peoples and Places,* with Glyn Daniel as series editor. These books were aimed at a wide public, but have perhaps tended to fall between two stools, being insufficiently detailed for the serious student but a little too difficult for most of the public. None the less the series seems to have taken a new lease of life recently, and its 100th volume is out.

In recent years many more publishers have begun to feel there might be a market for archaeology, and numerous series have been set up. Some fell away rapidly, others continue with varying levels of success. One difficulty is to find the writers who have the 'intimate and imaginative authority . . . without patronage or heartiness' needed for this kind of book (Daniel, 1948: 2). A recent reviewer said disapprovingly, 'This book is written by an expert mostly for other experts . . . the lay reader has to come to it equipped with a basic elementary knowledge of the subject and be prepared to dig deep – in both senses of the word' (L. Lewis, 1981). Possibly the fault lay with the publisher sending such a book for lay review: but it is worth wondering whether the author could have made himself a little more accessible without offending the 'experts'. The success of the Shire Archaeology shows that accessibility pays, as well as informing; and out of the distressingly large public for 'sensationalistic speculation and theorising of the von Däniken school' (Cole, 1980) at least some might be weaned away by real archaeology properly presented.

Treatment of archaeology by the mass media

Radio, television, and the press are potentially very important means of disseminating ideas, but far from easy to use. In the 1950s an immensely popular television programme called *Animal, Vegetable, Mineral?* ran for seven annual seasons, 1952–9. In this, personalities like Sir Mortimer Wheeler, Gordon Childe, Stuart Piggott, Glyn Daniel and Sean O'Riordain were presented with objects to identify; the point of the programme was less

the success of the identifications than the witty remarks of the archaeologists. Moreover the programme reinforced the idea that archaeology is about objects, preferably attractive or puzzling ones. Television producers like simple issues, strongly presented: archaeology is one of the topics (many of them scientific) which really do not lend themselves to simplistic treatment. With all the expertise that the BBC's *Chronicle* unit should have at its disposal by now, it still has not really grasped the 'intricately mysterious business', let alone got it across to the viewing public. If only *Chronicle* could have got away from the 'buried treasure' aspect of archaeology, perhaps we should be having less trouble with metal detector users now. Too rarely do we see the real work of the archaeologist conveyed on the small screen; Colin Renfrew is one of the few presenters who manage to achieve the necessary rapport with TV producers. When TV has actually exercised patronage, as when the BBC gave £20,000 for the right to film the Silbury dig, it singularly failed to convey much about the work of the archaeologist. The problem is not confined to archaeology: scientists of many kinds have difficulty in persuading the TV producers that good science, well presented, makes excellent viewing (*New Scientist*, editorial, 8 January 1981).

Disappointingly, the mass audience engendered by *Animal, Vegetable, Mineral?* failed to give publishers the impetus to provide books for them. Perhaps there were too few archaeologists to do the writing; many of them felt disdain for the 'Wheeler circus', and a clear lead from the CBA for archaeologists to capitalise on the public interest of the 1950s was not taken up by the writers who might have done it.

Radio, in cheering contrast, has done some excellently detailed and intelligent reporting of archaeology. The immediately post-war series called *The Archaeologist* (Daniel, 1948, 1954) was eventually followed by *The Changing Past* and then by *Origins*, the latter still running an annual series. All these originated in the provincial centre of Bristol, not from the nation's capital. Some good work is also being done on local radio, for instance Alan McWhirr's series in Leicester; and there are probably others. Southern TV has a series presented by Mike Hughes. The responsibility and genuine interest shown by local broadcasting seems to reflect that of the local press, which has long had a better record (as demonstrated by the CBA's press cuttings service, and counter to Fowler, 1977: 185) than the national press. Indeed, only in the last few years has the national press abandoned its flippant approach and adopted the informed and serious reporting that we now see in *The Times*, the *Sunday Times*, and the *Guardian* from writers like Patricia Connor and Martin Walker, as well as Norman Hammond.

Local government involvement

By the same token, it is often local government in the UK which has done most to foster public interest in archaeology. There has been a long series of 'implications reports' which explain the likely effect on archaeological deposits of redevelopment proposals in city or countryside. These reports, prepared usually by museum or unit archaeologists, vary enormously in quality from the classic to the barely adequate, but they have all had

the same general aim, to inform the general public and its elected representatives of the surprising fact that there are more 'documents' under their pavements or fields than in their official archives. The result of such reports has often been the establishment of a professional excavation unit to deal with at least some of the archaeological 'threats'. Built into the arrangements has usually been provision for post-excavation work and publication, but we are already seeing the unfortunate effects of financial cuts on these high hopes.

Popular journals

A highly imaginative venture in the 1920s was O. G. S. Crawford's *Antiquity*, meant for the general public; but it never went into the market place, never attained a really high circulation (Hudson, 1981, quotes 5,000 as the figure) and quite soon became an academic and relatively esoteric journal which could have made very few converts to archaeology. (For its guiding philosophy see Crawford, 1950, 1955; Daniel, 1961.) Post-war popular interest was nourished first by the *Archaeological News Letter* (1948–63) still an invaluable source of reference today, but confined, like *Antiquity*, entirely to those readers who were already committed to archaeology. It was followed by *Current Archaeology* in 1967, which is useful despite some idiosyncracies. Again it is available only on subscription and does not reach a wide public.

The latest magazine to appear, *Popular Archaeology*, set out to attract readers from a much wider spectrum, with a circulation of 25,000 (Hudson, 1981: 123). It can be found, with some diligence, on bookstalls, and its 'letters to the editor' demonstrate its readership as one intrigued by archaeology but unequipped for finding out about it. Unfortunately, we still have no equivalent to the excellent *Archéologia* produced in Dijon for a mass audience, and no one has even tried to emulate its high standards of content, presentation, and marketing. This, surely, was not the 'mere picture paper for brainless people' which Crawford was so determined should never be *Antiquity*'s fate? (Crawford, 1950: 3). 'The public have a right to be taken into the confidence of scholars, they are anxious to be interested, and they are often willing to assist. It is the duty of scholars to produce readable summaries of their work, and archaeologists have shown that it pays' – so wrote F. T. Wainwright (1949: 82), and the Frere Report reinforced this (Frere *et al.*, 1975: 2). Two hundred years before that Voltaire had the same kind of idea when he warned the historian: 'If all you have to tell us is that one barbarian succeeded another barbarian on the banks of the Oxus or Jaxartes, what benefit have you conferred on the public?' (Voltaire, 1764, quoted in Trevor-Roper, 1965: 10). In other words, we have to convince the public that what we are doing is of interest to them; and we ignore the advice at our peril.

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Abstract

An historical introduction indicates how British archaeological publication has reached its present complex structure. In recent years a combination of increased excavation, more complicated and demanding data collection, and rapidly rising publishing costs has led to reports becoming too unreadable and too expensive to find a market. Current experiments seem likely to lead to a pattern in which full reports are deposited in archives while much shorter ones are published in the conventional way, with additional data provided on microfiche. The availability of bibliographic and other information is also considered. Finally the way in which archaeological information is presented to our paymasters, the tax-paying public, is critically reviewed.

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Burials Within Settlements in Southern Britain During the Pre-Roman Iron Age

by C. E. WILSON

Introduction

Discussion of burial practices in the British Iron Age has tended to concentrate on the Arras and Aylesford–Swarling cemetery traditions, as 'no consistent grave type has yet been recognised which could be claimed as characteristic of the indigenous Iron Age culture of the pre-Belgic phase' (Harding, 1974). However Whimster (1977a: 317–27) has identified six burial categories for the later Iron Age, and suggests that as crouched inhumation appears to be a predominent theme in three of the southern groups, this might indicate the existence of an underlying native tradition. Two of these groups, 'Pit burial and related traditions' and 'Durotrigian burial in southern Dorset' tend to be closely associated with settlements, and settlement excavations have, over the years, produced a variety of human skeletal material in addition to complete inhumations. Finds have ranged from a few bone fragments or disarticulated bones to articulated limbs and partial skeletons. The location of the remains in ditch silts, disused storage pits, post-holes, etc., and frequent association with potsherds, animal bones, charcoal and other domestic debris was suggestive of extremely casual or accidental deposition. The sporadic occurrence and disparate nature of the material gave rise to a number of theories including cannibalism (Dunning, 1976: 116), ritual dismemberment of the dead and head-hunting. Cunnington (1933: 207) suggested that a belief in reincarnation might have led to a disregard for the fate of the body after death. More recently Ellison and Drewett (1971: 183–94) suggested that the majority rite was excarnation, and that one of the possible functions of four-post structures was as excarnation towers.

Pit inhumation has now been identified as a 'tradition', perhaps reinforcing a tendency to pay little attention to the more fragmentary remains (cf. Collis, 1977). However, there is a growing amount of information, particularly from recent settlement excavations, which gives an opportunity to look more closely at the various proposals. It is also possible that the skeletal remains found on settlements may provide some clues to the nature of indigenous burial forms, filling the vacuum identified by Hodson (1964) in his characterisation of the Woodbury Culture. The intention is therefore to examine

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the range of material available from sites in southern Britain in an attempt to assess whether this might be so.

This study consists of two sections: a list of sites with the material classified into groups, and a discussion of the distribution and significance of these groups.

Classification procedure

The material has been divided on a fairly arbitrary basis relating to the degree of fragmentation. The terminology of excavation reports implies that there may be six distinct categories:

1. Worked or utilised bone.
2. Bone fragments.
3. 'Disarticulated' bones – assumed to have become detached as a result of natural processes rather than deliberate human action.
4. Articulated joints and limbs.
5. Partial burials – where a substantial part of the torso is assumed to have been present on interment.
6. Complete burials – those which are assumed to have been complete on interment although there may have been later damage or disturbance.

The continuum is, in reality, perhaps far more complex than these terms suggest. For example the distinction between isolated bones or complete inhumations which became fragmented as a result of decomposition or later disturbance, and those which may have been deposited in an incomplete or fragmentary state is not always clear on excavation. In some cases the material could be assigned to more than one group, in others the wholesale nature of the distinguishing categories has the effect of splitting up material which might, with justification, be treated together. Even so, the six groups have been retained as the basis of classification because the terms are familiar, and the most frequently employed, and since they provide at least an initial framework within which the material can be assessed and compared.

One of the purposes of this exercise is to set out the information available. Therefore the material has been listed in full in preference to a more compact method of tabulation. It was felt that this would provide a more satisfactory basis for comparison as many earlier reports are vague regarding the location and stratigraphic relationship of finds, and taken at face value might imply conclusions which do not necessarily follow when the whole of the data are considered. A better opportunity to assess chronology and spatial relationships will come from the recently excavated sites, many of which still await publication. This study does not claim to be comprehensive; only the sites in southern Britain have been considered, but it is hoped that the emphasis on more recent excavations will, to some extent, compensate for omissions, and the inclusion of possibly doubtful sites.

Discussion

1. *Worked bone*

Worked bone has so far always been found associated with other categories of human bone. Naturally abraded bone fragments could appear to be worked if the breaks happened to create a regular shape, and the ulna 'scoop' at Lidbury might have been produced in this way. However, the recent evidence from Billingborough and Helpringham suggests that complete skull vaults were deliberately shaped into bowls (Chowne, forthcoming). This produces not only the worked vaults, of which skull 'scoops' may be incomplete examples, but also off-cuts which are 'worked' on one edge only. (These could perhaps be confused with skull fragments assumed to be the result of sword-cuts.) Skull pieces form the largest group of the worked material.

Perforations in bone can result from a variety of causes, of which disease and weathering after deposition are perhaps the most common (Brothwell, 1973). Of the three perforated post-cranial bones reported below, one is 'gnawed', and one apparently burnt. Therefore, without examining the material it is impossible to say whether the perforations were made intentionally.

The practice of trephination produces 'roundels' of skull bone similar to those found at Glastonbury and All Cannings Cross (Fig. 1b and c), and possibly Lidbury. The

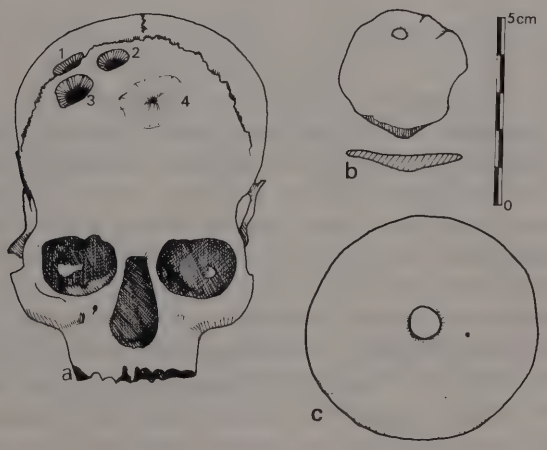

Fig. 1 Worked bone. (a) Trephined skull from Bronze Age Jericho. Hole diameters: (1) 2.02 cm, (2) 1.54 cm, (3) 2.33 cm. All made shortly before death, possibly by means of a centrally drilled hole finished with flint scraper. Hole (4) 3.00 cm dia., signs of healing. (After Oakley *et al.*, 1959: Pl. F.) The conformation of holes 1–3 is similar to that described for the Hunsbury skull. (b) All Cannings Cross, Wilts. Roundel 'cut from dead skull' – but not necessarily human. The hole is asymmetrically worn, therefore the object may have been suspended. (After Cunnington, 1923: Pl. 26.) (c) Glastonbury, Som. Roundel cut from 'occipital of old person'. (After Bulleid and Gray, 1917: Pl. LXIII.)

operation was, and is, performed 'both as a surgical remedy, and as a means of securing fragments of human skull – widely regarded as powerful fetish objects' (Oakley *et al.*, 1959: 93). Trephination was also practised posthumously, removing a 'piece of bone from the dead skull of one previously trepanned which included a piece of healed rim from the earlier operation' (Lisowski, 1967: 659).

The pierced skull discs might well have been obtained for similar purposes, and worn as amulets. Although there are descriptions of trephined skulls from Iron Age Europe (Lisowski, 1967: 653) there is otherwise little evidence of the practice in Britain during this period, either in burials or from isolated crania. The discs were obtained from sites occupied during the EIA, for which there is comparatively little skeletal material. Trephination is known from the British Bronze Age and the practice may have continued into the early Iron Age in some areas.

Trephination could also have produced an effect similar to that described on the Hunsbury skull fragment (cf. Fig. 1a), but it appears to have been dried at the time of the operation and the off-cuts would have been extremely small. The holes were perhaps more likely to have been made as a means of suspending the skull, possibly for display as a war trophy – as seems to have been practised in Iron Age Gaul (Chadwick, 1978: 49) – or some other ritual purpose.

The worked material has been found mainly in E or MIA contexts, and its distribution is fairly localised.

2. *Fragmented bone*

This group is likely to have been derived from various origins: for example, some remains may have been broken at the time of or shortly after death, some weathered or scavenged above ground and some become fragmented after deposition.

Of the 30 sites where fragmented bone has been found, all contain skull fragments and skull fragments occur alone on 13 sites. They therefore considerably outnumber post-cranial bones (identified on 16 sites) but they do not seem to represent more than a few individuals including children.

Where skulls are associated with other bones it seems reasonable to infer that they are derived from the same originally complete skeletons. Exposure burial, secondary interment, disturbed primary interment and differential preservation are possible causes of fragmentation. Exposure burial is to be discussed in greater detail below, but where bone is left to weather above ground for any length of time the surface acquires a layered, onion-skin appearance (D. Brothwell, pers. comm.). Again, without examining the material it is not possible to say if such weathering took place. The above ground weathering of bones may have causes other than excarnation, and exposure practices need not extend to the point of total disintegration. Scavenged bones are mentioned twice, at Hardwick, which contained three skull fragments only, and Highfield where breaks had occurred in both dry and fresh bone, some of them assumed to have been the result of injury at the time of death (M. L. Tildesley, in Stevens, 1934: 618–19).

Scavenging is therefore relatively rare, could have occurred at any time during the history of the site, and need not in any case be a concommitant of ritual exposure practices.

Apparently deliberate redeposition was found on three sites, Rotherly, Woodyates and Mount Farm. A similar deposit was found at Bredon Hill in connection with disarticulated material. Again the examples are scarce and do not constitute particularly strong evidence for the deposition of previously exposed corpses. Rotherly and Woodyates have both produced a large number of complete inhumations, and the fragmentary deposits may simply be re-location due to later building work. The recently excavated site of Mount Farm, however, has apparently redeposited infant burials within the settlement (G. Lambrick, pers. comm.). Although the majority of the material seems to have arrived in its context accidentally, a certain amount of human bone must, however, have been widely present on sites for it to have been retrieved in excavation.[1]

Over the sites as a whole, bone fragments are evenly distributed in interior and perimeter contexts (21 interior, 20 perimeter), although recent evidence from Mount Farm and Winnal Down suggests that areas outside the main dwelling sites were preferred for the deposition of human remains. This is in line with LBA developments when cremations were increasingly being inserted in field ditches close to settlements.

3. *Disarticulated bone*

Since disarticulated bone is perhaps regarded as characteristic of the human material found on settlements, the number of recorded instances is surprisingly small. This could result from a confusion in terminology relating to the distinction between 'fragmented' and 'disarticulated' material. However, the group appears to be more varied in composition and possibly in origin than the fragmentary bones, and (apart from the partial, unpublished excavation at Heacham, Norfolk) has not been found in isolation on the sites covered.

In two cases, Gussage and Mount Farm, the material is likely to have been derived from complete infant burials. This might also be true of the majority of infant bones from Ashville, Fengate and Glastonbury. Where adult bones are mentioned, it seems less likely that they derive from skeletons which were complete on deposition. The disarticulated material is found predominantly in interior pits and rubbish deposits in earlier periods, and is found in ditch silts mainly in Romano-British contexts. The greater number of disarticulated infant remains in later levels – as compared with the fragmented

[1]Controlled tests were recently carried out at West Hill, Uley, Glos. (Levitan, 1981), to measure the quantities of material of all types missed by diggers under normal excavation conditions. It was found that only 3.4% of bones were recovered manually, although these represented a considerable larger proportion by weight (751 g as opposed to 280 g). Miss C. Cartwright examined the animal bone material from Balcombe Quarry, Sussex, at my request, and found three instances of human bone. These examples suggest that in the past smaller or fragmentary human bones may often have been overlooked. As the fragmentary material appears to be more characteristic of the E–MIA, the rarity of human material on sites of this period could in part be due to the inadequacies of excavation and post-excavation techniques.

Table 1. Location and phasing of disarticulated material (documented contexts only)

EAI		MIA		LIA		RB	
I	P	I	P	I	P	I	P
6	1	8	4	7	4	2	5

I = interior contexts; P = perimeter contexts.

material – undoubtedly reflects to some extent the survival capacity of infant bones over the period as a whole. But even allowing for a consistently higher rate of infant mortality, the comparative scarcity of disarticulated adult remains in later periods suggests that procedures less productive of disarticulated material were employed.

Three sites require individual comment. The material from South Cadbury is clearly related to the 'massacre' level (dated to the period AD 45–61: Campbell, Baxter & Alcock, 1979). The child's leg bones in the Heacham pit may have been articulated on interment, and if so could be compared to the three articulated legs found at Danebury (Cunliffe, 1974: 292, see below).

The female skeleton at Salmonsbury is unique in that it is represented by a surface scatter, on an apparently unploughed site. It was suggested that the bones were deliberately broken in order to extract the marrow (Dunning, 1976). The pelvis, vertebrae and all leg bones except the right femur were absent and parts of the skull were distributed over the area. Dunning considered that 'the bones from Salmonsbury are the most convincing evidence yet adduced for the practice of anthropophagy in Britain'. Even if his interpretation is correct, the existence of a widespread rite cannot be assumed from a single example.[1]

There is a further documented instance of a surface scatter of bones on the pre-barrow surface at Handley, Dorset – near the Gussage settlement – which seems to have been a cremation site (White, 1970: 26–36). Although it is possible to infer a relationship between this type of site, and the remains present on, or absent from, settlements, there is not yet sufficient hard evidence to connect them. (It is also possible to compare this evidence with the hearths found at Bredon Hill (Hencken, 1938), Croft Ambrey, (Stanford, 1974: 136 ff.) and the ritual site at Harlyn Bay (Whimster, 1977b). The last two sites were also later covered by mounds, as at Handley.)

[1]A surface scatter of bones can, of course, be produced by various agencies either after interment or when the body remains on the surface. Ploughing can both break and scatter buried bones and damage occurring even after the bones have been buried for some time can result in greenstock fractures (D. Brothwell, pers. comm.). The activities of rodents and other burrowing animals can also disintegrate a skeleton below ground, as can scavengers and weathering when a corpse is left on the surface. Binford (1979) noted that dogs on Nunamiut camp sites caused fractures to long bones indistinguishable from those made by women processing bones for marrow. The Salmonsbury evidence could therefore have been due to various factors, cannibalism being probably the least likely.

If infant burials, 'massacre', Roman and other doubtful sites are omitted, only 10 sites containing disarticulated material remain. It cannot therefore be said that this group is either numerically large or particularly characteristic of Iron Age settlement burials.

4. *Articulated remains*

The number of sites containing articulated parts of bodies is, again, relatively small. It is difficult to make a clear distinction between these and partial burials but, referring solely to the terminology fo the excavation reports, they seem naturally to fall into a hillfort 'massacre' group. (The example from Barnham looks remarkably isolated, and there are no other burials on the site.) The question exists whether the material truly represents the victims of a military encounter, but it seems difficult otherwise to account for the phenomena of Bredon Hill and South Cadbury. Alcock (Campbell, Baxter and Alcock, 1979) assigns the South Cadbury material to the period of the Boudiccan revolt on radiocarbon dating. Hencken (1938) found no Roman weapons at Bredon Hill, and concluded that mutilation, dismemberment and exposure (or non-burial) of the bodies of victims was customary in the PRIA. The appearance of 'dismemberment' could be produced by scavenging animals if the bodies were left exposed outside the habitation area. Deliberate cutting-off of arms and legs would be observable on articular joints, as with the dismembered Bronze Age skeleton at Maiden Castle (Wheeler, 1943: 345–6), where Wheeler was able to describe the sequence of dismemberment. The 'war-victims' at Sutton Walls were simply decapitated (see below), and it seems that at Maiden Castle the British survivors of Roman attacks were allowed, or made considerable efforts, to bury their dead according to current formal procedures.

While the massed deposits in ditches could be explained as a single event in the life of the hillfort, the similar material found in pits within the habitation area is more problematic, and certainly could have been deposited over an extended period. It seems reasonable to associate mutilation and exposure with defeat and dishonour. There is some indication in the complete burials, and from some examples in the disarticulated and fragmentary groups, that an attempt was made to keep the remains together, therefore exposure of isolated parts of a corpse, as at Danebury, might represent insult or punishment. As a whole, the evidence indicates that mutilation of corpses was not a part of normal burial practices in the Middle and Late Iron Age.

5. *Partial burials*

This is a small and unsatisfactory group, which is no doubt of mixed origins. Later disturbance on sites might easily produce partial remains, and the 'drastic mutilation' to the Wandlebury female could have a similar cause. Setting aside emotive description, this burial is comparable to the two rampart burials at Bury Hill (Hawkes, 1940: 322) (see Fig. 2c) where ploughing, natural erosion of the topsoil and rabbit activity, etc., apparently account for the condition of the remains. It is noticeable that the Wandlebury burial contains those bones – pelvis and vertebrae – which are absent from the scatter of

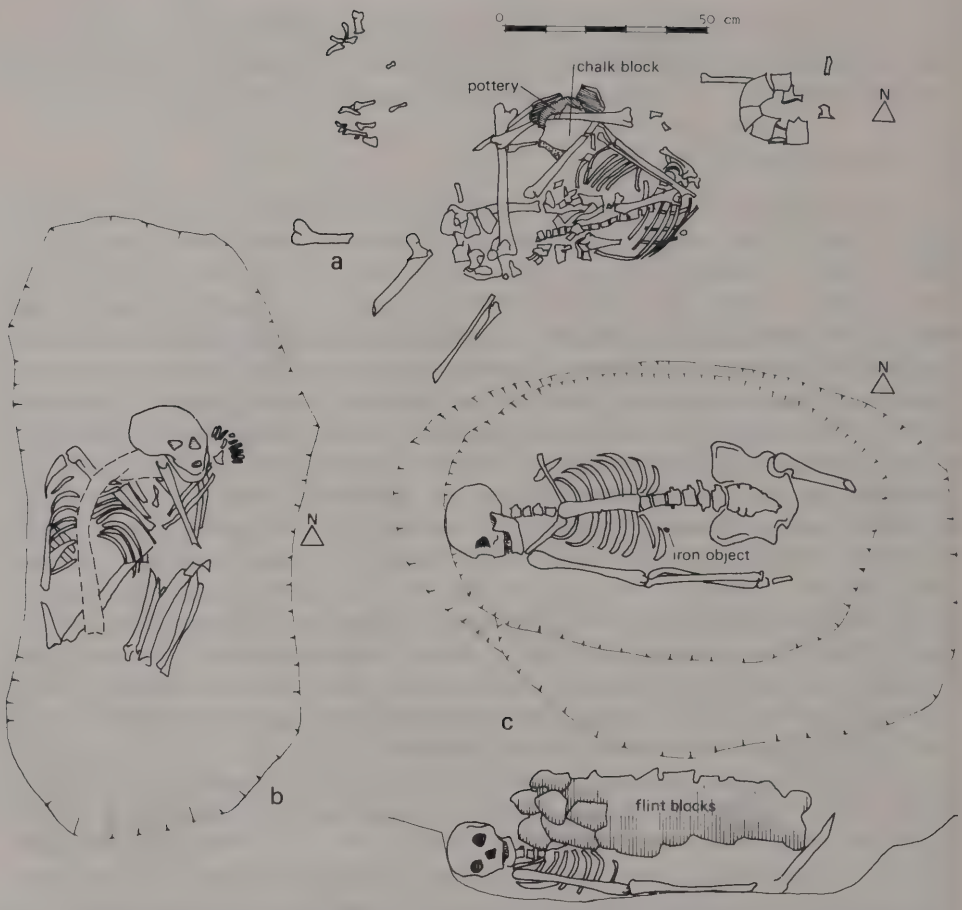

Fig. 2 Fragmentary and disturbed burials (a) Winnall Down, Hants. MIA female pit burial. Fragmentation due to later disturbance. (Information provided by the M3 Archaeological Rescue Committee.) (b) Fengate, Cambs. LIA male burial in grave. Fragmentation due to differential decomposition. (Information provided by the Cambridgeshire Archaeological Unit.) (c) Bury Hill, Hants. Grave I, plan and section, female burial on back with flint blocks. (After Hawkes, 1940: Fig. 12.) Hawkes considered that the flint blocks were placed to protect the body, and that the appearance of mutilation was caused by scavenging animals.

female bones at Salmonsbury. The latter might therefore be the distributed remnants of an originally complete inhumation. The kind of disturbance caused by later inhabitants of a site is graphically illustrated at Beckford (Britnell, 1974: 297). The lower leg bones of a crouched inhumation were cut off when a new storage pit was dug, and were later redeposited when the pit was back-filled. The report suggested that as the burials on the site were grouped in an area where pits were afterwards made, other burials might have been destroyed.

The evidence from Winklebury suggests that there may have been exposure of female corposes in pits, perhaps comparable to the exposure of selected limbs at Danebury (Smith, 1977: 74). Exposure might also produce the appearance of mutilation or a scatter of bones. The three partial burials on the site had been decapitated before burial, and the skulls of the two females were absent. Headlessness is not common in Iron Age inhumations, which is perhaps surprising in view of the amount of isolated cranial material found – although decapitation prior to burial is found in some Roman cemeteries, e.g. Lankhill's Cemetery, Winchester (R. J. Watt in Clarke, 1979: 342) and more recently at Dunstable, and at Beckford (Britnell, 1974). In the Roman burials the skull is included with the body, as it is with the Winklebury male. On the whole, headlessness has ritual overtones; this seems to be particularly likely at Worthy Down. There is one crouched female burial at Woodcutts where the skull was found separated from the rest of the skeleton (Pitt-Rivers, 1887) but this may be a mixture of Roman and native traditions. There is also another female skeleton at Wandlebury, crouched on its back, with the vertebrae not in proper relationship (see Group 6).

The Gussage skeleton, with one leg missing, seems to have been deposited with less care than other burials on the site (except for a complete but 'hunched' inhumation in the same ditch). The Danebury – and possibly Barnham – evidence suggests that some significance was given to severed legs although the ritual is not apparently a common one and, as is suggested above, might be related to the punishment of criminals. The Stanton Harcourt burial could be the result of a similar procedure.

The Worlebury example could be a less mutilated massacre victim. On the other hand, apart from being more complete, it was buried separately in a large pit, and associated with burnt material and 'pebbles'. 'Debris from hearths', charred wood and 'cracked pebbles' were also found in the pits at Stanton Harcourt, which was a small rectangular enclosure associated with a field system. Williams (1951) described the site as having a short occupation period, and compared the pottery with that from the ritual site at Frilford, Berks., where infants and a child burial were found (Harding, 1972) (see Fig. 3c).

The other partial burial at Wandlebury, that of a child in a sack,[1] could be compared to the partial child burial at Wards Coombe, Bucks. Dunnett (1972: 141–55) was disinclined to accept the idea that the 'pre-Belgic' phase at this site might have been a settlement, because of the lack of domestic refuse and metalwork. Williams made a similar observation about Stanton Harcourt, and this, together with its claimed short life suggests that it also may have been a ritual site, as indeed might Lidbury.[2] Its rectangular

[1] Although burial in sacks is occasionally put forward to account for constricted body positions in complete inhumations, the only other example which seems to have produced direct evidence for a sack is the warrior burial at Grimthorpe, Yorks. (Stead, 1968).

[2] The site at Lidbury is included by Grinsell (1958) in his list of Wessex hillforts, although it is, as he explains (p. 174), a square ditched enclosure adjacent to a hillfort which had been extensively damaged, and never excavated. Hearths and burnt flint are found within the enclosure, and there is a curious 'ditch occupation' phase also associated with hearths and ashes (Cunnington and Cunnington, 1917: 12–36).

ditch could be compared to the subsequent square ditch at Handley Barrow. Small, square-ditched sites (perhaps analogous to Viereckschanzen) close to settlements could easily appear to be part of the related field system. However there seem to be tenuous links between those which have been excavated and a number of LIA-RB ritual sites or temples which also contain hearths, burnt debris and human remains.

6. *Complete burials*

The total of complete inhumations has been considerably increased by the finds at recent settlement excavations like Gussage-All-Saints and Winnall Down. Even so, the numbers are, for statistical purposes, extremely small; under 300 complete burials, including children, have been described in this report, and in some cases the source of the information is too imprecise for it to be used in illustration of the points made. A restricted sample does not of itself invalidate the inferences which may be drawn from it, although they cannot be put forward with the confidence that a greater amount of material would allow. The tabulations are therefore intended to outline trends, rather than indicate precise quantities.

The material will be considered under the following headings:

(a) Body position and orientation
(b) Unusual positions and treatments
(c) Location of burials
(d) Differential treatment of males/females and children/adults.

(a) *Body position and orientation.* Settlement burials run the gamut of contracted body positions from very tightly crouched to loosely flexed. An unnatural constriction could be obtained by binding the corpse, as apparently with the Frilford child and the South Cadbury adult (Fig. 3c and d). Even greater constriction might be obtained where the body is semi-decomposed, but still in articulation on interment. This possibly explains at least one of the Fengate burials which was apparently forced into a narrow grave, causing the pelvis to disarticulate (Fig. 3a). An even tighter crouch seems to have been obtained at the Maxey sub-site (F. Pryor, pers. comm.). Another example is the unphased, but possibly EIA, female at Winnall Down (Fig. 3b), crammed into a small quarry pit. It is possible that extreme contraction therefore represents secondary burial, although contraction, and disarticulation of limbs could in some cases, be the result of settlement after decomposition in the ground. It is extremely difficult to cause disarticulation of joints by pressure only, in a fresh or partially decomposed corpse (D. Brothwell, pers. comm.).

Moderately crouched positions could be obtained by looser binding, or careful arrangement of the body. Frequently it appears that the hands and feet were tied, e.g. at Bishopstone (Fig. 4b), and this is often suggested in reports. Very tight and tightly crouched positions are rare in both sexes, and a moderate crouch seems to be preferred (cf. Fig. 3e and f). More males than females are buried in moderately flexed positions on the sites where position has been indicated (Table 2), but the numbers are too small for

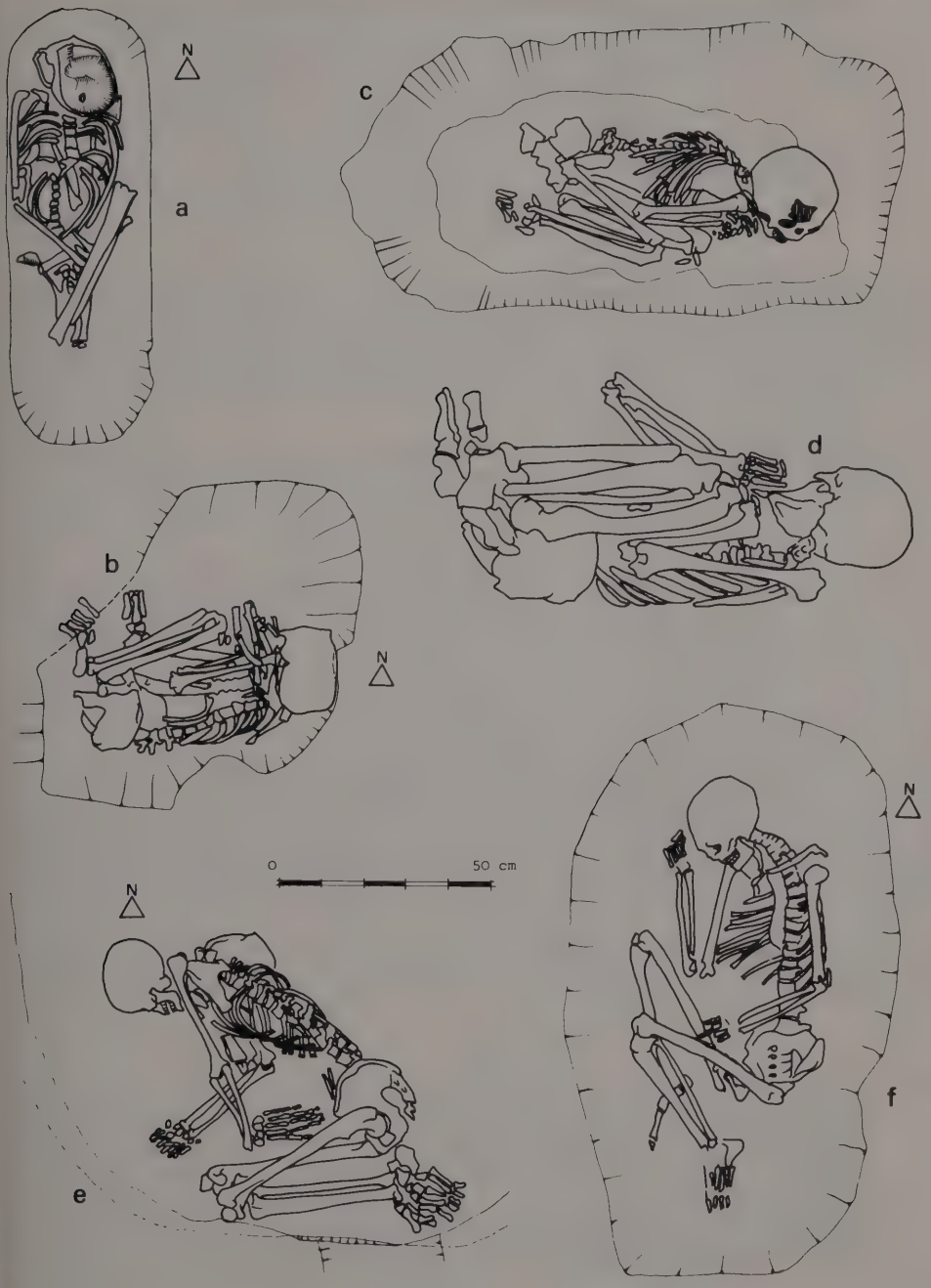
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Table 2. Comparison of degree of contraction of males and females (not including back burials)

	Crouched			Flexed	
	Very tight	Tight	Moderate	Moderate	Loose
Males	1	1	10	9	1
Females	1	3	13	5	3

this difference to be significant. Date does not seem to dictate the postures, as a variety can be found on the same site during the same occupation period (e.g. Gussage and Fengate). However, the majority of settlement burials occur in the LIA, so that the rare, more constricted body positions may represent the survival of an earlier rite which took place away from occupation sites.

In the examples where orientation and disposition is given, there is a bias towards the left side in both sexes, and for the heads to be directed between north and east, but again the sample is extremely small (Table 3). As Whimster (1977a) observed, there is a slight tendency for similar positions to recur on individual sites.

(b) *Unusual positions and treatments.* Apart from side crouches, the other most frequently occurring position is for the corpse to be laid on its back, often with the legs tightly bent and drawn up towards the chest. In view of the difficulty of maintaining a body in this posture during burial, it seems likely that the majority were bound. Decapitation is sometimes associated with these inhumations, and the back position may, therefore, have a ritual significance. In addition to treatment to the head, other ritual features tend to occur in this group. The male at Ashville was lying at the entrance to a 'possibly ritual' penannular enclosure, the male at Worthy Down was in an unusual key-hole pit, and the South Cadbury example may have been a 'foundation burial'. Among the females one is associated with an infant (these 'mother and child' burials tend to occur outside habitation areas), and one at Woodcuts – with the head detached – was buried in a corn drying oven, not surprisingly the only example of a burial in this location, although it might be compared to the key-hole pit at Worthy Down. North-westerly and south-easterly orientations each occur twice in this group (see Table 4). Both are rare positions among side burials.

Fig. 3 Crouched burials. (a) Fengate, Cambs. Very tightly crouched LIA male burial, hips dislocated to fit into grave. Possibly a secondary deposition. (b) Winnall Down, Hants. Very tightly crouched, unphased (EIA?) female burial in quarry pit. (c) Frilford, Berks. Romano-British temple site. Tightly crouched child burial. (After Harding, 1972: Pl. 34.) (d) South Cadbury, Som. Tightly crouched male rampart burial, possibly bound before deposition. (After Alcock, 1970: Pl. V.) (e) Winnall Down, Hants. Moderately crouched MIA male burial in beehive pit. (f) Fengate, Cambs. Moderately crouched LIA male burial in grave. (a) and (f), information provided by the Cambridgeshire Archaeological Unit; (b) and (e), information provided by the M3 Archaeological Rescue Committee. (c) and (d) are not drawn to scale.

Table 3. Disposition and orientation of male and female burials (data from site nos 4, 7, 11, 12, 14, 22, 26, 27, 30, 32, 42, 46 and 53)

Table 3a Comparison between males and females on sites where side and orientation is given

	Males									Females								
	N	NE	E	SE	S	SW	W	NW	Total	N	NE	E	SE	S	SW	W	NW	Total
Right side	1	1					1		3	2	2	2	1			1		8
Left side	3	1	1					1	6	2	2	2	1	1	2	2		12
Total	4	2	1				1	1		4	4	4	2	1	2	3		

Table 3b Comparison of total numbers of male/female orientations on sites where orientation is given

	Males								Females							
	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
	8	6	2		1		1	2	5	4	5	2	2	2	3	

Table 3c Totals of left and right side burials on sites where side is given

	Males	Females
Right side	3	8
Left side	7	14

It is impossible to say whether the back position should be regarded as equally significant in all cases. With the Bishopstone female for example (Fig. 4a), it could result from movement of the body during burial, or the inclusion of an infant in the grave.

Other positions are mentioned on four sites: the hunched, contorted inhumation at Gussage can be compared to the two males 'in an attitude of struggle' at Worlebury.

Table 4 Inhumations placed on their backs, including partial burials

Male			Female			Unsexed		
Site		Orientation	Site		Orientation	Site		Orientation
2	1	–	7	1 + ch	E	35	1*	–
29	1	NW	14	1	E			
35	1	SE	33	1*	NW			
48	1	–	39	1	SE			
52	1*	N–S	51	1*	–			
London	1	N	52	1	E			

*= treatment to head; ch = child; London = Borough High Street, SE 1, see Additional Sites

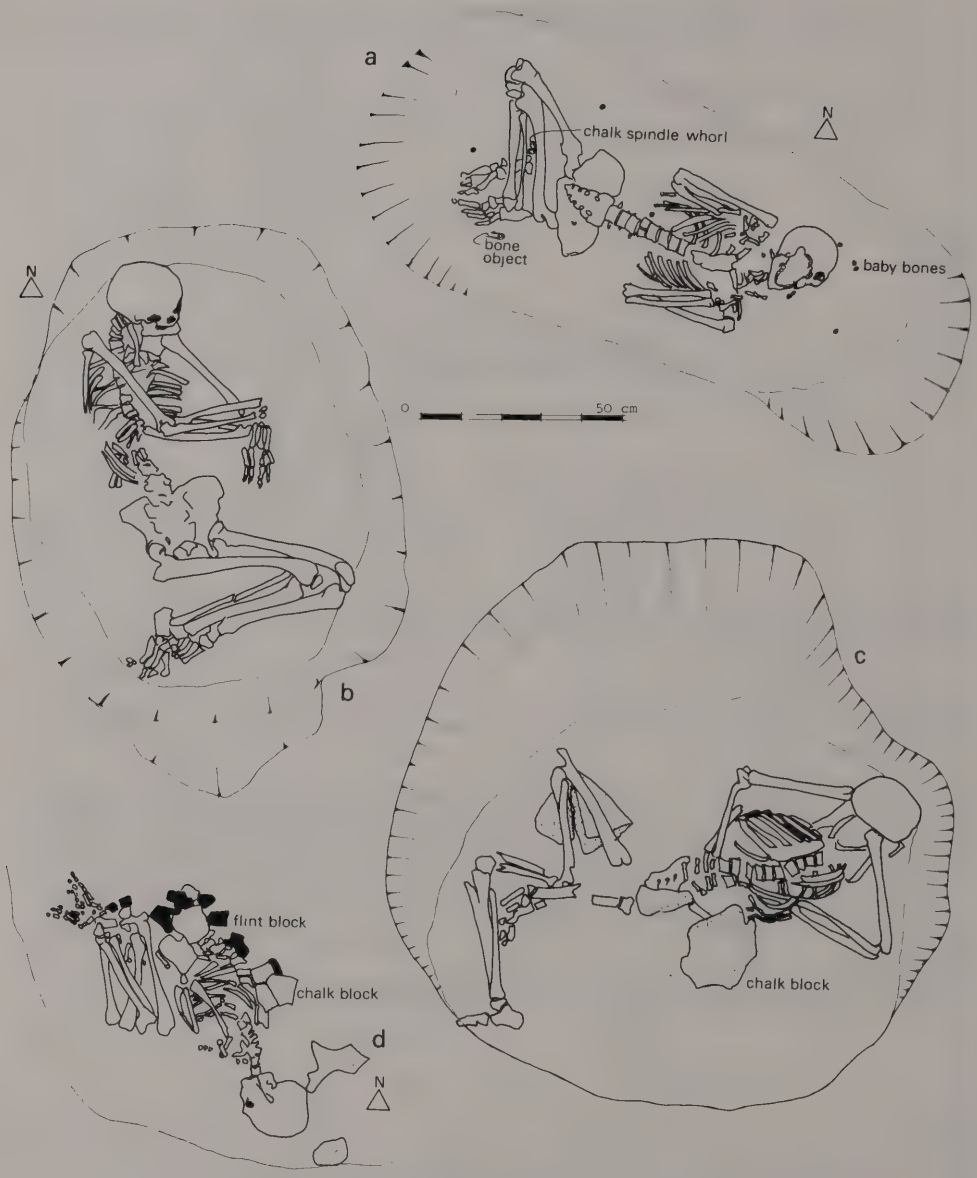

Fig. 4 (a) Bishopstone, Sussex. EIA female and infant burial, deposited in grave in enclosure ditch. (After Bell, 1977: Fig. 38). (b) Bishopstone, Sussex. MIA male pit burial. The position may indicate that the hands and feet were tied. (After Bell, 1977: Fig. 39.) (c) Maiden Castle, Dorset. Male 'foundation' burial. (After Wheeler, 1943.) (d) Gussage-All-Saints, Dorset. MIA female pit burial with flint and chalk blocks outlining back. (After Wainwright, 1979: Fig. 26.) (c) is not drawn to scale.

Table 5 Burials with stone blocks

Site	
	Males
29	1 on back, chalk packed around skull
30	1 crouched, crushed by stones
46	1 flexed, rampart burial, limestone blocks over
	Females
50	1 partial, crushed by limestone blocks
12	1 crouched, skull crushed by flint blocks
14	1 crouched, flint and chalk outlining back
39	1 on back, rampart burial, flint blocks over
	Infants
32	1 in post-hole with flint packing
46	1 rampart burial, limestone blocks over

Contorted positions could be the result of rigor mortis, which implies a rapid, informal disposal of the body, or burial while still alive. This might explain the 'crushed' female at Hod Hill (Richmond, 1968: 16), although an appearance of crushing could also be produced by settlement. There is also a semi-upright 'Durotrigian' female burial at Litton Cheyney (Bailey, 1967), but these examples are so few and disparate that it is doubtful whether any special significance can be attached to them.

Nine burials are mentioned associated with blocks of flint, stone or chalk (Table 5). Twice these were apparently used to keep the body in position during interment (e.g. Fig. 4d). Otherwise they seem to have been deliberately placed to protect the body, perhaps against disturbance by animals, as suggested for the female rampart burial at Bury Hill (Hawkes, 1940: 323), or casually included as part of the fill. Crushing of various parts of the body by large blocks (e.g. at Fifield Bavant, Twywell and Worlebury), is as likely to have been caused by later settlement then procedures such as live burial or deliberate abuse of the corpse.

(c) *Location of burials.* Settlements: The tendency which is suggested by the small sample available seems to be one of gradual infiltration on to the sites (Table 6). Adult inhumations in the EIA are extremely rare (only three burials have been assigned to this period by excavators), but those which have been identified were deposited in perimeter ditches rather than locations within the settlement boundary. If the burials known for the M and LIA can be regarded as representing a general trend, there appears to be a slight bias towards interment in interior pits and graves by the LIA. Infants make a more belated appearance in large numbers in interior contexts, but by the LIA comparatively fewer infants are buried on the periphery than are adults.

This suggests that the inclusion of burials within settlement areas was due to a gradual change in custom, and that earlier burials may have taken place outside, but fairly close to, habitation sites. However, it is possible that disposal rites were also changing

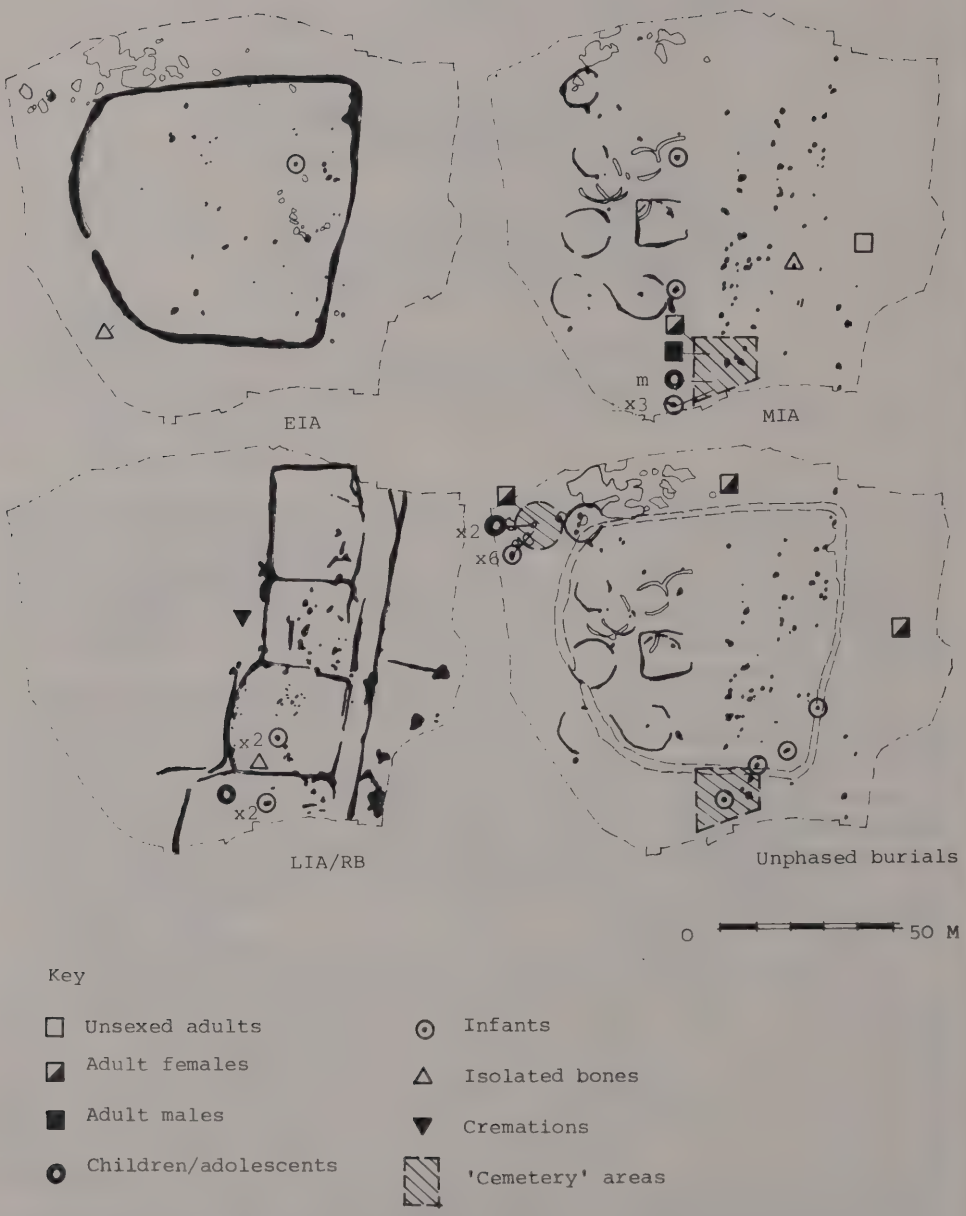

Fig. 5 Winnall Down, Hants. Plans showing the location of burials from the Early Iron Age to the Romano-British period. (After Fasham, 1978b: Fig. 6, and additional information provided by the M3 Archaeological Rescue Committee.)

over the same period, and that the procedures which produced the isolated bone fragments were being replaced by complete inhumation.

Two recently excavated phased settlements, Winnal Down and Mount Farm, demonstrate that even within occupation areas, burials were placed in pits or rubbish-dump areas away from dwellings. At Winnall Down there are two favoured deposition sites giving the appearance of small cemeteries within the settlement itself (Fig. 5). Of the sites which have been examined here, Barton Court Farm seems to be the only example where a crouched adult inhumation was found inside a dwelling.

Hillforts: No hillfort burials are cited for EIA contexts, but in the M and LIA there seems to be a development similar to that of the settlements, with perimeter (rampart) locations gradually giving way to interior burials. On the phased sites, however, there is less emphasis on interior inhumations than seems to be demonstrated for settlements, although this may be a bias resulting from a greater preoccupation with ramparts and entrances on the part of earlier excavators, and the difficulties of complete areal excavation. At Hod Hill, where a considerable part of the interior was uncovered, only six interior burials were found, five of them in two separate 'horseshoe' enclosures (Richmond, 1968: 26). One enclosure contained two male burials and a fragmentary inhumation, the other contained three female burials. The structures may therefore have fulfilled a ritual function related to the sex of the inhumations. The hillfort at Broxmouth, East Lothian (Hill, 1979), had four interior burials and an external cemetery with eight inhumations radiocarbon dated to the period 400–100 bc (P. Hill, pers. comm.). Grimthorpe also has a small cemetery outside the ramparts (Stead, 1968: 148–90), and some of the southern hillforts might have had a similar arrangement although no clearly defined cemetery areas have been found so far. The majority of 'pre-Durotrigian' burials at Maiden Castle were found in ditch silts, or in pits in the body of the rampart, and this less formal distribution seems to be more typical.

It therefore appears that inhumations were not, on the whole, randomly dispersed within occupation areas and that an effort was made to keep them to prescribed locations away from dwellings.

Pits and graves: Of the two, deposition in a specially dug grave implies more care, or investment of energy in the disposal rite. If, however, the act of final disposal was of less importance than the preceding ritual, a grave may simply have been dug because there was no empty pit available. Pit inhumations predominate within settlement areas. Graves, and circular pit-graves were dug in ramparts and perimeter ditches. The choice of a pit or grave form may therefore have depended to some extent on the generally preferred location for burials on individual sites. 'Scoops' may perhaps be regarded as less distinguished graves, possibly reflecting the status of the corpse, or the time and/or number of people available to perform the interment.

Foundation burials: These are assumed to be connected with the primary building or enlargement of hillfort ramparts or enclosure ditches. A similar interpretation is

Table 6a Location of complete burials on phased settlement sites

Phased sites	EIA				MIA				LIA			
	Adults		Infants		Adults		Infants		Adults		Infants	
Settlements	I	P	I	P	I	P	I	P	I	P	I	P
2										1		
4									1	1	2	2
5					5	3	1	8		1		
7		1		1	1							
13									1		9	1
14			1		1		4	1	9	1	30	2
21									1		9	2
22		2	2	2				6				2
26									4	6		
27					1	1						
29										1		
30									1		2	
31											1	9
32			1			4	2	6				
35										1		
Totals		3	4	3	8	8	7	21	17	12	53	18

I = interior contexts; P = perimeter contexts.

Table 6b Location of complete burials on phased hillfort sites

Phased sites	EIA				MIA				LIA			
	Adults		Infants		Adults		Infants		Adults		Infants	
Hillforts	I	P	I	P	I	P	I	P	I	P	I	P
36						1						
37						1						
38							1					
39						1				1		
42									6	2	2	
46						1		6	1	7		4
47										1	2	
48										1		
49						1						
50									1			
51									1			
52									5			
53						2						
Totals						7	1	6	14	12	4	4
Totals from all sites		3	4	3	8	15	8	27	31	24	57	22

I = interior contexts; P = perimeter contexts.

occasionally put forward for some animal burials (e.g. the dog skeleton discovered in the BA ditch at Rams Hill; Bradley and Ellison, 1975: 42–5). However a considerable number of burials are known from rampart areas, and a specifically ritual function perhaps need not necessarily be ascribed to those discovered *beneath* ramparts. There are only four examples where this occurs on the hillfort sites: at Battlesbury, Hod Hill, Sutton Walls and Maiden Castle (Fig. 4c). The Battlesbury inhumation is unusual in two respects: it is inserted in a Bronze Age barrow, and also may be an extended burial. The suggestion of human sacrifice is perhaps implicit in the term 'foundation burial', but as the three remaining examples, in circular pit-graves, do not, apart from their location, substantially differ from other rampart inhumations, it is not possible to draw any firm conclusion about their ritual significance.

(d) *Differential treatment of males/females and children/adults.* Female and child burials have been found on settlements in EIA contexts, although the number of these reported is perhaps too small to be significant. Infants below a certain age are not given full burial rites in many societies (Ucko, 1969), and if this were true of Iron Age Britain it might also follow that the relatively high proportion of (low status) infant burials within habitation sites in the E–MIA indicates the breakdown of previous traditions (Table 7).

Fig. 7 Chronological distribution of complete burials

	EIA			MIA			LIA		
	M	F	I	M	F	I	M	F	I
Settlements		3	7	4	4	21	23	9	39
Hillforts				2	2	5	11	13	8
Total		3	7	6	6	26	34	22	47

M, males; F, females; I, infants.
In doubtful cases the burials were assigned to the latest IA phase of the site.

There appears to be virtually no sexual differentiation in the disposal methods applied to adults when the data are considered as a whole. Artefacts are associated in only a few cases, and one – Bishopstone – is an example of an early female burial with an infant. Mother and child burials are rare within settlement boundaries. There may be a single example at Hod Hill, otherwise they are found in ditches, e.g. Bishopstone, Cassington and possibly Balcombe Quarry, or as isolated occurrences, e.g. Roundham. Women who died in childbirth may have been deliberately placed at the edge of, or away from, occupation areas.

Chronological changes in the material as a whole

The chronological distribution of the various groups of material over the main sites covered is shown in Table 8. Unfortunately there are still very few closely dated contexts

Table 8 Chronological distribution of material types. Documented contexts are underlined, possible contexts are shown in brackets

Type of material	EIA	MIA	LIA	Number of sites containing material
Worked	3 (6)	(7)	(5)	10
Fragmented	6 (9)	3 (14)	5 (11)	30
Disarticulated	3 (8)	2 (9)	5 (9)	18
Articulated	(1)	(2)	4 (2)	6
Partial burials		1 (3)	2 (3)	7
Complete burials	5 (5)	9 (13)	16 (11)	38

from which to trace developments, and conclusions must remain speculative. In outline the distribution suggests that worked and unworked skull fragments were the earliest materials to be found on settlements, followed by the fragmentary remains of complete skeletons. These become relatively scarcer in later periods as the numbers of complete burials increase. It would seem that evidence of EIA burial forms should be sought in the fragmentary remains, either within settlements or from locations in the surrounding field systems.

Disarticulated material is found in early contexts, but, together with articulated material and partial remains, seems to be more characteristic of the LIA. The last two groups are found infrequently on settlements, and it is doubtful if they were related to mainstream practices.

Within the complete burial group, children and females appear first on the sites, but while the number of children remains high, the incidence of females relative to males diminishes towards the end of the period. (This imbalance would be further exaggerated if massacre sites were taken into account.)

Discussion of previous suggestions

(a) *Disregard for remains*

In a number of cases there seems to have been preparation of the corpse before burial, e.g. tight binding of the body or the tying of hands and feet, but it is uncertain whether these should be regarded as fundamentally different from the flexed inhumations where no prior treatment apparently was given. There is no evidence of the procedures which might have accompanied inhumation, or taken place beforehand, although these may have been conducted on the periphery of, or outside settlements, perhaps connected with the use of 'ritual hearths' or enclosures. Several procedures, among them cremation, exposure or secondary burial, or simply burial in unmarked graves away from settlements, may have been used in parallel depending on the status of the deceased or local custom.

(b) *Skull fetishes*

Isolated fragmentary, or complete, skulls and mandibles tend to be found more frequently in EIA contexts. In view of the comparative scarcity of human remains in this period, it is not possible to relate the material to any contemporary inhumation rites which may have taken place. In the M and LIA formal burials without skulls are extremely rare, and if some continuity of tradition can be assumed, the process which created the isolated skulls and fragments was not a part of normal burial practices. This indicates that the circumstances producing the material were unusual, particularly as the headless burials which exist possess features suggestive of ritual (Worthy Down) or punishment (Winklebury). Decapitation is a characteristic of massacre sites, however, where it is often explained as the result of trophy-taking by the victors. Hencken (1938: 23) suggested that at Bredon Hill the trophies were displayed over the gateway, as a line of 'skull tops' was found across the entrance to the hillfort. The Classical descriptions of Gaulish head-hunting practices (cf. Chadwick, 1978: 49), in which the heads of enemies were carried home to be nailed to house entrances, may therefore be supported by the archaeological evidence from British sites. Isolated cranial material has been found more or less equally distributed in interior and perimeter contexts. Alternatively, the Bredon Hill skull tops may have been similar to the worked vaults found at Billingborough (see p. 129, above), and neither these, nor the pierced discs need necessarily have been connected with head-hunting, but could have fulfilled some other ritual purpose.

(c) *Dismemberment*

This has been discussed in some detail above. It is confined to group massacre incidents on hillfort sites or in a few isolated cases, again mainly on hillforts, applied to individuals. It appears to be related to 'punishment' or insult and not to be a part of normal burial procedure.

(d) *Cannibalism*

This would seem to be a largely mythic practice for which there is little secure documentation from ethno-historical sources (Arens, 1979: 874–7), and there is no direct evidence for it on settlement sites so far. It is possible to envisage situations (as in any period or society) where it might have occurred – e.g. on hillforts during siege warfare. If it was practised it must have been rarely so, or away from settlements.

(e) *Cremation*

Urned cremation is regarded as the normal Bronze Age burial form, therefore suggestions that cremation might account for the 'missing' Iron Age burials are sometimes based on the reasonable assumption that earlier rites may have persisted, but with some

change in custom which led to the remains being disposed of by methods which were not recoverable by archaeological means. A possible cremation site may have been found at Handley Barrow, Dorset (White, 1970: 26–36), where the 'pre-barrow surface was covered with cremated bone, ash and charcoal'. Pieces of skull, vertebrae and long-bones surrounded the main concentration; these were interpreted as a ritual scattering of bones after cremation. An apparently well-burnt corpse might contain many bones virtually intact, particularly at the extremities. Such bones might show little sign of burning, and if they remained on the ground surface could eventually find their way into ditch fills, etc. However, in only one instance, Worlebury, is it suggested that a piece of bone may have been burnt, and the black staining mentioned could be the result of other causes. Human bone was also found in the debris of a large hearth at Bredon Hill, but apart from these two examples there is nothing in the settlement material to indicate that cremation may have been practised in the Early and Middle Iron Age. The formal cremations which have been recovered from settlements appear to date from the late 1st century BC, influenced by the intrusive Belgic tradition, or to belong to the Roman levels.

Burnt material is often associated with inhumations and skeletal remains, and is usually interpreted as domestic debris, but it is possible that the household goods and belongings of the deceased were burnt, and buried with them. It is suggested above that some sites, e.g. Stanton Harcourt and the ditched enclosure at Lidbury, may have been used for ritual purposes, these may have included funerary rituals and possibly cremation. However, if cremation was widely practised more evidence might be expected in the skeletal material which has been found. Alternatively, cremation may only have been employed in special cases, possibly for individuals of high status.

(f) *Excarnation*

The fragmentary material is most often cited as being the best direct evidence for exposure burial (e.g. as in Ellison and Drewitt, 1971: 190–2). Bone fragments may have many origins, exposure being only one, and as Ellison and Drewett point out, there are drawbacks to excarnation taking place within settlement areas. It does however seem to have occurred within at least two hillforts, Winklebury and Danebury, where the remains were exposed in pits, although neither of these examples was apparently related to majority rites. There is some indication with the very tightly crouched burials that partially decomposed bodies may have been interred. Buried or dumped bundles of fragmentary and disarticulated bones are also found on sites. The evidence from the more complete material is certainly not conclusive of previous exposure although it is sometimes suggestive of secondary burial.

The most detailed work on excarnation and secondary burial has been carried out in North America (e.g. Anderson, 1964; Ubelaker, 1974). Among the historical descriptions is one by Spelman (in Ubelaker, 1974: 10), 'the body was wrapped in a mat and deposited on a scaffold three to four metres above the ground. After the flesh decomposed, the Indians wrapped the remaining bones together in a new mat and hung

Fig. 6 Mount Farm, Oxon. Plan showing location of Iron Age Burials. (Information provided by the Oxfordshire Archaeological Unit.)

them in "their howses wher they continew whille ther house falleth and then they are buried in the ruings of ye house..."'. The remains scattered within settlements could result from similar practices.

The Potomac River Indians buried the remains of exposed and cremated individuals in collective ossuaries. The overall quantities of bones from different parts of the body which found their way into the ossuaries were influenced by factors which included differential decomposition of muscles and ligaments: '...joints such as the shoulder, elbow, wrist, hip and knee (separate first). Separation next occurs at the joints between the sacrum and the pelvis, bones of the hand, lower leg and foot, radius and ulna,... skull and first cervical vertebrae,... skull and mandible ... The tibia and fibula and bones of

the feet are the last to become disarticulated' (Ubelaker, 1974: 28). Loss of bone prior to secondary burial, intentional cultural selection of the most 'representative' bones (usually long bones), and differential decomposition were other factors accounting for variation in the material. Clearly a more thorough analysis than has previously been carried out is necessary before it is known whether the frequencies of disarticulated and fragmented bones on British Iron Age sites compare with the data obtained in North America. Equally, any British exposure practices would no doubt have been subject to different methods of manipulating the material during and after excarnation. This aspect of Iron Age skeletal remains requires further intensive investigation before exposure burial can be demonstrated. This being said, if it is assumed that excarnation *was* the majority rite in

Fig. 7 Map of main sites mentioned in the text.

the Early Iron Age, the change in custom which resulted in complete inhumations may at first have taken the form of contraction of the length of time the body was exposed – perhaps beginning with low status females and children. Binding or wrapping of the corpse, exposure for various periods of time in pits or other places within the settlements may be hangovers from earlier, more involved burial rituals.

There is some evidence that excarnation was practised in Britain during the Neolithic period. This is discussed by Drewett (1977: 224–6) in relation to the possible functions of causewayed enclosures, and it is suggested that they may have been used as excarnation sites. There are a number of similarities in the Neolithic and Iron Age material: the generally crouched position of complete inhumations and the lack of grave goods, the quantities of occupation debris associated with human remains, and the regular occurrence of fragmented and disarticulated bone 'casually lost' in ditches.

It therefore seems that there is an indigenous precedent for the morphology of the skeletal material characteristically found on Iron Age settlements, particularly earlier in the period. This in itself suggests that there may have been long-standing native traditions, as yet incompletely documented, underlying the more visible manifestations of the Bronze Age and later Iron Age burials.

List of main sites mentioned in the text and references

Settlements

1.	All Cannings Cross, Wilts.	Cunnington (1923)
2.	Ashville, Abingdon, Oxon.	Parrington (1978)
3.	Barnham, Suffolk	Martin (1979)
4.	Barton Court Farm, Abingdon, Oxon.	Benson and Miles (1974 and forthcoming)
5.	Beckford, Worcs.	Britnell (1974), Wills (forthcoming)
6.	Billingborough, Lincs.	Chowne (1979a, b), Chowne (forthcoming)
7.	Bishopstone, Sussex	Bell (1977)
8.	Blacknall Field, Pewsey, Wilts.	F. K. Annable (pers. comm.)
9.	Cold Kitchen Hill, Wilts.	Cunnington (1934: 29)
10.	Farmoor, Oxon.	G. Lambrick (pers. comm.)
11.	Fengate, Cambs. (Cat's Water and Padholme Road sub-sites)	Pryor and Cranstone (1978)
12.	Fifield Bavant, Wilts.	Clay (1924)
13.	Glastonbury, Som.	Bulleid (1949), Bulleid and Gray (1917)
14.	Gussage-All-Saints, Dorset	Wainwright (1979)
15.	Hardwick, Oxon.	T. G. Allen (pers. comm.), Oxfordshire Archaeol. Unit
16.	Heacham, Norfolk	E. J. Rose (pers. comm.; unpub. report Norwich Museum)
17.	Helpringham, Lincs.	Chowne (forthcoming)
18.	Highfield, Fisherton, Wilts.	Stevens (1934)
19.	Iwerne, Dorset	Hawkes (1948)
20.	Meare, Somerset	Bulleid and Gray (1953), Gray (1966)
21.	Micheldever Wood, Hants.	Fasham (1976, 1978a, and in preparation a)
22.	Mount Farm, Dorchester, Oxon.	Lambrick (forthcoming)
23.	North Bersted, Sussex	Bedwin (1978)
24.	Park Brow, Sussex	Wolseley and Smith (1924)
25.	Pimperne Down, Dorset	Harding (1972: 69), Harding and Blake (1963)
26.	Rotherley, Wilts.	Pitt-Rivers (1889), Hawkes (1948)
27.	Slonk Hill, Shoreham, Sussex	Hartridge (1978)

28.	Stanton Harcourt, Oxon.	Williams (1951)
29.	Tollard Royal, Wilts.	Wainwright (1968)
30.	Twywell, Northants.	Jackson (1975)
31.	Wakerley, Northants.	Jackson and Ambrose (1978)
32.	Winnall Down, Hants.	Fasham (1978b and in preparation b)
33.	Woodcutts, Dorset	Pitt-Rivers (1887), Hawkes (1948)
34.	Woodyates, Dorset	Pitt-Rivers (1892), Hawkes (1948)
35.	Worthy Down, Hants.	Hooley (1929)
Hillforts		
36.	Balksbury Camp, Andover, Hants.	Wainwright (1969)
37.	Battlesbury Camp, Wilts.	Cunnington (1923), Guido (1980)
38.	Bredon Hill, Glos.	Hencken (1938)
39.	Bury Hill, Hants.	Hawkes (1940)
40.	Danebury, Hants	Cunliffe (1971, 1972, 1974, 1976)
41.	Figsbury Rings, Hants.	Cunnington (1934: 29, 1925)
42.	Hod Hill, Dorset	Richmond (1968)
43.	Hunsbury, Northants.	Dryden (1885), Fell (1936)
44.	Kingsdown Camp, Mells. Somerset	Gray (1930)
45.	Lidbury, Wilts.	Cunnington (1934: 29), Cunnington and Cunnington (1917)
46.	Maiden Castle, Dorset	Wheeler (1943)
47.	Salmonsbury, Glos.	Dunning (1976)
48.	South Cadbury, Somerset	Alcock (1967, 1970, 1971), Campbell, Baxter and Alcock (1979)
49.	Sutton Walls, Hereford	Kenyon (1953)
50.	Wandlebury, Cambs.	Hartley (1957), Taylor and Denton (1977)
51.	Winklebury, Hants.	Smith (1977)
52.	Worlebury, Avon	Dymond and Tomkins (1886)
53.	Yarnbury Castle, Wilts.	Cunnington (1933)

1. Worked bone

Site	Settlements	Date	Description of material
1.	All Cannings Cross	EIA	Four skull pieces: (1) a rectangle 1¼ × 1½ in, cut on two edges; (2) a rectangle cut on one edge; (3) a piece 'polished all over' with fractured edges; (4) a roundel 1 in diameter 'cut from dried bone' and perforated (see Fig. 1a)
6.	Billingborough	E–LIA (EBA–RB)	Approximately 10 skull pieces including off-cuts. The skull vaults were cut off to form a bowl
9.	Cold Kitchen Hill	EIA–R	One pierced patella, interpreted as a spindle whorl
12.	Fifield Bavant	EIA	'Cup or scoop' of complete frontal bone, edges worn smooth
13.	Glastonbury	E–LIA	One roundel with central perforation (see Fig. 1b)
17.	Helpringham	E–MIA	One piece of skull with cut edges
20.	Meare	E–LIA	One 'gnawed, cut and perforated' femur
	Hillforts		
43.	Hunsbury	E–LIA	One skull piece with a triangular arrangement of three holes 'bored posthumously with a metal implement'
45.	Lidbury	EIA	One 'shaped and perforated piece of cranium'; one 'upper part of an ulna cut into a scoop-like implement'
52.	Worlebury	MIA–R	One 'piece of worked humerus' cut smooth, blackened by fire and 'bored through as if for suspension'

2. Fragmented bone

Site	Settlements	Date	Description of material
1.	All Cannings Cross	EIA	Twenty-eight unworked skull fragments, representing 9–12 individuals, five male, three female and unsexed
2.	Ashville	MIA	One skull fragment in Phase I pit (*c.* 4th century BC). Fragmentary femur in ditch
4.	Barton Court Farm	LIA	Fragmentary cranium in enclosure ditch.
6.	Billingborough	E–LIA	Approximately 15 unworked skull fragments scattered over site
10.	Farmoor	EIA	One piece juvenile skull in enclosure ditch (G. Lambrick, pers. comm.)
11.	Fengate		
	(a) Cat's Water	M–LIA	MIA contexts: In pit, female skull fragments mixed with animal bone. In enclosure ditch, adult pelvic and cranium fragments. LIA contexts: Pit, adult skull and tibia fragments. Hut galley, adult clavicle and radius. Boundary ditches, adult femur with green fracture, adult mandible and radius, child's skull and infant's femur fragments. R contexts: Weathered humerus in ditch. (Bones in ditches 'may have been washed into fill')
	(b) Padholme Road		Adult frontal and mandible fragments in pits
12.	Fifield Bavant	E–MIA	Gnawed skull fragment in pit
13.	Glastonbury	E–LIA	Skull fragments and scavenged adult tibia in hut mounds
14.	Gussage-All-Saints	EIA–R	Phase II (4th–2nd century BC): Approximately eight skull fragments and three femur fragments in enclosure ditch. One femur and one skull vault in pits Phase III (1st century BC–2nd century AD): One skull vault and four long-bone fragments scattered in pits over site
15.	Hardwick	MIA	Three scavenged skull fragments in outer enclosure ditch
17.	Helpringham	E–MIA	Approximately four unworked skull fragments scattered over site
18.	Highfield	E–LIA	Male and female skull, jaw and long-bone fragments, some with apparent evidence of 'fatal blows' and scavenging scattered in pits over site
20.	Meare	E–LIA	Skull and long-bone fragments in and below hut mounds
21.	Micheldever	LIA–RB	Adult skull fragments and infant long bones in enclosure ditch and interior pits
22.	Mount Farm	E–LIA (Neo–AS)	E–MIA contexts: 'Probably redeposited' adult and juvenile skull fragments plus one humerus, some in pits but mainly in field ditches. Also fragmented remains of 12 burials in field ditches – see Group 6
23.	North Bersted	MIA	Nine skull fragments in enclosure ditch – possibly from one male
24.	Park Brow	EIA	One female cranium fragment in pit.
25.	Pimperne Down	EIA	Skull fragments buried at the foot of several post-holes in the east gateway, and fragmented skull and femur in ditch near north gateway
26.	Rotherley	LIA–RB	Jaw and long bone fragments in pit. Bone fragments with burnt flint, pots and sheep/ox teeth in three deposits under wall foundations

Site	Settlement	Date	Description of material
32.	Winnall Down	EIA–RB	EIA: Infant skull fragment in pit. MIA: Adult fragments in pits, gully and enclosure ditch, infant fragments in post-hole and pits
34.	Woodyates	LIA–RB	Deposit of skull and long-bone fragments 'collected and buried' in ditch. One femur in pit, skull fragments in pits and drains
	Hillforts		
37.	Battlebury	M–LIA	LIA(?): 'One piece human radius' in pit
38.	Bredon Hill	M–LIA	MIA: One child skull fragment in pit. Adult skull fragment and child mandible in floor fill of small hut close to rampart. Various fragmented bones with ash and animal bones in fill of paved hearth behind rampart. 'Skull tops' in debris on line of gateway
41.	Figsbury Rings	EIA	Bone fragments with occupation debris in inner rampart ditch
42.	Hod Hill	M–LIA	One skull fragment in interior pit. Also the scattered fragmentary remains of 'one individual' near gateway
44.	Kingsdown Camp	LIA–RB	Adult skull fragments, one with sword cuts in inner ditch
45.	Lidbury	EIA	One skull fragment in pit with threshing debris and quern stones. Skull, vertebrae and humerus fragments in enclosure ditch
46.	Maiden Castle	M–LIA	Two child skull fragments in Phase I rampart, one male skull, one female skull and femur fragments in pits in rampart area
48.	South Cadbury	M–LIA	Skull fragments in bank material
51.	Winklebury	E–LIA	LIA: Fragmentary adult skull, long bone, hand/foot bones, and infant long bones in pits. Adult mandible and part vertebral column in house drainage trough

3. Disarticulated bone

2.	Ashville	MIA (BA–R)	Bones of two infants and one child in pit. Adult tibia and vertebrae in separate pits
5.	Beckford	EIA–R	'Three instances of disarticulated bone' E–MIA contexts – still being analysed
11.	Fengate (Cat's Water)	M–LIA	Infant femurs in ditches (associated with adult bone fragments). One complete male cranium in pit.
12.	Fifield Bavant	EIA	Two skulls in separate pits, one 'badly gnawed' by canine
13.	Glastonbury	E–LIA	'Isolated bones belonging to young adults or children evenly distributed over site' (including teeth and two skulls)
14.	Gussage	E–LIA	Disarticulated bones are mentioned only in connection with infant burials – which may have been complete on deposition
16.	Heacham	?	Leg bones of a child *c.* 10 years associated with animal bones in pit
20.	Meare	E–LIA	One skull, between hut mounds
21.	Micheldever	LIA–RB	Infant tibia and fibia in enclosure ditch. Infant bones in pit
22.	Mount Farm	E–LIA (BA–RB)	All disarticulated material seems to belong originally to complete Roman infant burials in pits and ditches

Site	Settlements	Date	Description
32.	Winnall Down	EIA–RB	EIA: Twenty-one adult bones in pits and ditch, collection of infant bones in pit. MIA: Adult and infant bones in pits, gully and enclosure ditch. LIA: One infant femur in pit
	Hillforts		
38.	Bredon Hill	M–LIA	A 'parcel of bones' consisting of two adult skeletons and three mandibles was found in a post-hole in main gateway. Also disarticularted bone was scattered on 'massacre' site – see Group 4.
40.	Danebury	E–LIA	Disarticulated bone was found 'scattered in rubbish deposits'
42.	Hod Hill	M–LIA	Two levels of disarticulated bone were found in the same pit within a horseshoe shaped enclosure
43.	Hunsbury	E–LIA	'Several skulls' in pits
48.	Salmonsbury	E and LIA	Phase I: Infant and adult bones in hut gullies and pits (one skull, ribs and vertebrae mentioned) Phase II: Disarticulated bones of partial female skeleton scattered over an area 5 × 9 m, long bones apparently broken 'to extract the marrow'
48.	South Cadbury	EIA–RB	Disarticulated bones associated with 'massacre' site
53.	Yarnbury	MIA–R	Two femurs, radius, finger bone, mandible and frontal bone in enclosure ditch
4. Articulated limbs and joints			
3.	Barnham	LIA	Articulated left leg and foot found in the top fill of a pit in inner enclosure ditch
	Hillforts		
38.	Bredon Hill	M–LIA	Legs and legless and headless torsos of young adult males (approximately 60 individuals) 'unburied' in gateway (*c.* 1st century AD)
40.	Danebury	E–LIA	'Odd limbs and pieces of human trunk occur sporadically' in pits. Three legs, one torso and one mandible were 'exposed in a specially dug elongated pit'. (Additional data being analysed at time of writing)
48.	South Cadbury	E–LIA (Neo-R)	'Curiously disjointed' remains of both sexes including children, headless and legless torsos, etc. (28 individuals) left unburied in ditch. Possibly 'pulled apart by animals'. (Radio carbon dated to AD 45–61)
52.	Worlebury	MIA–R	'Portions of 18 skeletons' in pits, 'half bearing the marks of cutting weapons'
5. Partial burials			
14.	Gussage-All-Saints	E–LIA	Phase III (60 BC–AD 100): An unsexed skeleton 'thrown at random' into enclosure ditch, head resting on a pile of pot-boilers, right leg and pelvis missing
28.	Stanton Harcourt	MIA	A 'dismembered skeleton', some bones missing, 'heaped haphazardly' in a pit
35.	Worthy Down	M–LIA	An adult skeleton in a double pit or shaft, crouched on back, head removed. Associated with two chalk-daub 'pillars'

Site	Settlements	Date	Description of material
	Hillforts		
49.	Sutton Walls	EIA–R	The decapitated skeletons of young males were found unceremoniously buried in rampart ditch, interpreted as a 'massacre' site
50.	Wandlebury	MIA–R	The 'upper half' of a child in a sack, with domestic rubbish in a 'specially dug' grave. A 'drastically mutilated' female skeleton in a shallow circular grave, partly crushed by limestone blocks, legs broken off below pelvis, skull and jaw separate (cf. Fig. 10a)
51.	Winklebury	E–LIA	LIA: One fragmentary adolescent female, skull absent, 'left uncovered to be buried by natural silting process' in pit. One very fragmentary female, bones scattered, skull absent, in pit. One male crouched on back, north–south, skull detached and put at base of spine, left arm missing, in pit
52.	Worlebury	MIA–R	One skeleton in a large pit, lower legs missing, cuts to skull, collar bone and arms. 'Pebbles' and charcoal in fill below
	6. Complete burials		
2.	Ashville	MIA–R	One crouched male in pit in entrance to penannular (ritual?) annex, on back, knees drawn up (nine burials in R cemetery, one extended R child burial in ditch + one unsexed, undated cremation inside LIA enclosure)
4.	Barton Court Farm	LIA–RB (Neo-Med)	Adults: One crouched male, head south, inside round house. One crouched female, head south, in field outside occupation area. Infants: One in post-hole. One in grave within occupation area. Two neo-natal in IA ditches (may be R)
5.	Beckford	EIA–RB	E–MIA period: Adults: Five in pits, three in ditches. LIA period: One crouched adult in boundary ditch (R period: Adults: One crouched, one flexed, six extended, with heads between knees – all in graves, one child in grave in boundary ditch). Data still being analysed
6.	Billingborough	E–LIA (EBA–RB)	IA contexts: One extended female, east–west, one disturbed burial, 'probably the result of sub-soiling'
7.	Bishopstone	E–LIA (BA–RB)	Late EIA: One young flexed female + infant, in ditch, with grave goods (?) perforated long bone and spindle whorl, MIA: One flexed male in storage pit, 'hands and feet bound' on back, legs bent, head east left side, head north-west (Fig. 4a, b)
11.	Fengate (Cat's Water)	E–LIA	LIA (1st–2nd century BC) contexts: Adults: Three males crouched in graves, heads north (e.g. Fig. 3f), one young male in grave 1 × 0.35 m (hips dislocated to fit), head north (Fig. 3a), one fragmented adolescent in grave, head east. Children: One child five to seven years in ditch
12.	Fifield Bavant	E–MIA	Crouched female in pit, left side, head north-east, 'hands and feet bound' skull crushed by flint blocks
13.	Glastonbury	E–LIA	Adults: One, exposed or unburied 'outside a hut'. Children: Two within and seven between hut mounds, one outside occupation area.

Site	Settlements	Date	Description
14.	Gussage-All-Saints	E–LIA	Phase I (8th–5th century BC): One infant in shallow pit Phase II (4th–2nd century BC): Adults: One crouched adolescent female, left side, head south, flint and chalk nodules outlining back, in pit (Fig. 4d). Infants: Two disarticulated in base of separate pits. One crouched left side, in base of pit, head north. One crouched, right side, in top of pit, head north. Two disarticulated in enclosure ditch. Phase III (1st century BC–1st century AD): Adults, female (all in pits): Adolescent, light flexed, on face, head north. One, loose crouch, right side, head north. One, loose crouch, left side, head east. One, tight crouch, left side, head east. One, flexed, right side, head east. One, legs flexed, on back, head east. Adults, male (all in pits): One, flexed, right side, head north-east (apparently injured in a fight). One, knees bent, left side, head east. One, flexed, right side, head north (+ articulated bones of dog and horse). Adults, unsexed: One, in enclosure ditch, hunched up, arms and legs contorted. Infants: A total of 32 infants, two in ditches, 30 in pits. (Roman: One extended coffin burial outside enclosure: Undated: Two fragmented infants).
19.	Iwerne	M–LIA	One crouched pit burial with grave goods (now lost).
21.	Micheldever	LIA–RB	Adults: One crouched adolescent female in pit. One extended male in ditch (R?). Infants: Nine in pits, two in enclosure ditch. (Romans: One male coffin burial in ditch)
22.	Mount Farm	E–LIA (Neo-AS)	E–MIA contexts: Adult females: One, overlaying ploughsoil, crouched left side, head north. One, in small shallow grave, left side head south-west – both in pit/gully area close to occupation associated with a small amount of domestic rubbish. Infants: Two 'redeposited' in occupation rubbish dump. One 'redeposited' in back-filled EIA pit. One dumped/buried in small pit 30 cm diameter. MIA contexts: Infants: Four neo-natal, dumped in field ditches. Two redeposited in gully close to occupation area. LIA contexts: Infants: One neo-natal redeposited in field (see Fig. 6 for location of IA burials). (Roman: Two fragmentary infants)
26.	Rotherly	LIA–RB	Adults, female: One crouched in pit, head east. Male: One crouched in pit, left side, head north. Four crouched in upper fill of large pit, heads north-east. (plus one infant). Two flexed in ditch, heads north. One flexed in square pit in fill of enclosure ditch, left side, head north-east. Unsexed: Two in rectangular pits in gully fill (one crouched, one flexed). One fragmentary in same gully, crouched. One fragmentary, in pit, crouched. (Roman: Two extended in ditch). Infants: A total of 21 infants in pits and ditches.

Site	Settlement	Date	Description of material
27.	Slonk Hill	EIA–RB	MIA contexts: Adult female, crouched in grave, left side, head north, hands and feet bound (?), with shale bracelet and fibula. Adult male, flexed in pit, left side, head north (with mussel shells)
29.	Tollard Royal	LIA	One adult male, crouched, on back, head north-west, chalk lumps packed around skull, in shallow oval pit outside enclosure ('Roman'?)
30.	Twywell	M–LIA	Adults: One male, crouched in pit, left side, crushed by stones over. Children: Two (six and nine years), crouched in separate pits. (Also pig and dog burials on site including one 'crouched' pig with stone pillow)
31.	Wakerley	LIA–R (AS)	LIA: Infants: Nine in top of ditch fill, one in pit. (Roman: Eleven adult burials and four infants in shallow graves)
32.	Winnall Down	EIA–RB	EIA: Infants: One fragmentary, in shallow pit within occupation area MIA adults: Female: One, fragmentary (crouched, right side, head west), in pit with animal bones (Fig. 2a). Male: One crouched, in pit, right side, head west (Fig. 3e). One flexed, in pit, left side, head north-west. Unsexed: One tight crouch, in grave, left side, head east. Children: One (female?), eight to nine, crouched, right side, head west. Infants: Six in pits, one in grave, one in post-hole with flint packing over Unphased: Adult females: One, very tight crouch, right side, head east (EIA?) in quarry pit (Fig. 2b). One adolescent in grave, left side, with adult bones. One adolescent in grave, tight crouch, left side, head west. Children: One *c.* 12, in grave. Infants: Four in graves, two in pits, one in scoop, two in post-holes. (Roman: One child extended in grave, one infant in ditch, two in scoops, one cremation) (see Fig. 5 for location of IA–RB burials)
33.	Woodcutts	LIA–RB	Adults: Crouched: Six in pits, one in corn oven on back, legs flexed, head detached, one outside enclosure, six 'irregularly thrown in pits' ('Roman massacre?'), 10 extended. Infants: A total of 22 (including three 'foetuses') in pits and ditches
34.	Woodyates	LIA–RB	A total of 20 adult burials including one crouched male pit burial with Claudian fibula, two fragmentary (crouched?) burials in enclosure ditch, six extended in ditch graves, one extended in enclosure bank, five in Roman cemetery enclosure (including one with head removed, one cremated in ditch)
35.	Worthy Down	M–LIA	Adults: One adult male at round end of keyhole-shaped pit, crouched on back (this and the partial burial on the same site are both outside main occupation area).
	Hillforts		
36.	Balksbury	MIA	Late MIA (Phase III rampart enlargement): One 'informal burial' against rear of bank, in a black, ashy deposit with animal bones, sherds and stone tools

Site	Settlement	Date	Description of material
37.	Battlesbury Camp	M–LIA	M–LIA?: One (possibly extended) burial as a secondary deposit in a BA barrow, overlaid by IA hillfort rampart
38.	Bredon Hill	M–LIA	MIA: One infant burial in post-hole in bronze working site. One female, in rampart, flint blocks over, 'disturbed by scavenging animals' (Fig. 2c). One fragmented in rampart – disturbed by erosion, rabbits, etc.
40.	Danebury	E–LIA	'Some complete inhumations in pits' (additional data being analysed at time of writing)
42.	Hod Hill	M–LIA	Early LIA?: Rampart burials: One adult female, in circular pit/grave, on haunches and 'crouched down' chalk mound over, covered by rampart. One adult, unsexed, in circular grave (found by workmen). Interior burials: Inside small, horseshoe-shaped enclosure having three internal pits. Pit I: One disturbed primary and one secondary female burials with infant, crouched, left side, bronze grave goods, horse, ox and pig jaws. Pit II: One crouched female, left side, hands/feet 'bound', with bronze and bone objects, quernstones and potsherds. (A similar structure was found during an earlier excavation, again three internal pits, one with disarticulated bone (see Group 3), one with a primary burial of one male and child and a secondary crouched young male. The pits contained 'domestic refuse', cf. above. Also one crouched skeleton 'in interior')
43.	Hunsbury	E–LIA	One crouched adult in pit, possibly with iron objects
46.	Maiden Castle	M–LIA	MIA: Rampart burials: Adults: One male 'foundation burial' flexed, in circular pit, limestone blocks over (Fig. 4c). Infants: One infant under limestone blocks, beneath rampart, one infant in grave under rampart, three infants in rampart material. LIA: Rampart burials: Adult females: One flexed, left side, head west, in ditch. One crouched, right side, head south-east, in pit. One flexed, right side, head north-east, in pit. One tight crouch, left side, head south-east, in tip of rampart. One crouched, left side, head north-east, in pit. One crouched, right side, head north-east, in pit. Adult males: one flexed, left side, head north, in grave. Infants: One crouched in grave in ditch silts. Three crouched in pits. LIA: Interior burials: Adults: One female crouched in pit, left side, head south-west. Durotrigian cemetry: Adults: Eight males, eight females, three children. War cemetery: Twenty-three males, 11 females.
47.	Salmonsbury	LIA	Rampart burial: One unsexed, crouched, right side, head south-east, on outside slope of rampart. Interior burials: Two infants in pits with domestic rubbish and charcoal
48.	South Cadbury	E–LIA	Rampart burial: One male tightly crouched on back, in small scoop at rear of LPRIA rampart (Fig. 3d)
49.	Sutton Walls	EIA–R	Late MIA: Rampart burial: One male crouched, 'buried during course of rampart construction'. Early

Site	Settlement	Date	Description of material
			Roman: Three male, three female, crouched inhumations in graves, two infants
50.	Wandlebury	MIA–R	LIA: One female crouched on back in partly filled storage pit, 'vertebrae not in proper relationship', associated with two 1st century BC brooches
51.	Winklebury	E–LIA	LIA phase: One female on back, head east. One unsexed, discovered by workmen (three partial burials also on site – see above).
52.	Worlebury	MIA–R	Three adult skeletons at base of large pit over 'beach pebbles and charred corn' (one with sword cuts crushed by stones, one with pig's jaw and 'iron spike'), two others in separate pit 'in attitude of struggle'.
53.	Yarnbury	MIA–R	Rampart burials: One female flexed, in pit. One female crouched, right side, head north. (Roman: Two adults, one child in ditch silts) Undated: Nine infants in ditch silts.

Additional sites

Isolated crouched inhumations are occasionally found during building or quarrying work which are similar to those found on settlement sites. Others have been recovered during excavations of sites where it has not been possible to judge the extent of any likely Iron Age occupation. Although the status of many of these inhumations is doubtful they are sometimes quoted as possible examples of Iron Age burials, some however can be dated by associated finds. For the sake of completeness, a list of these isolated inhumations, some of which have not previously been published, is given below.

Partial burials

A possibly headless, crouched inhumation was found at Blackfriars Street, Leicester, below the foundations of a Roman town house, TPQ 10 BC. The long bones were missing due to later disturbance (P. Clay, pers. comm., Leicester Museum).

A crouched burial, with the skull disconnected from the vertebrae was found at Hanborough, Oxon. together with 3rd–2nd century BC pottery (Harding, 1972: 68; Case *et al.* 1964).

Massacre burials

Up to 100 bodies were found by railway construction workers at Spettisbury Rings, Dorset, in a 'pit' which may have been a silted-up ditch terminal (Gresham, 1939: 114–31). They were interpreted as the remains of two separate 'massacres', one mid 1st century BC, the other Roman, dated on associated finds. There is no description of the dispostion of the bodies; sword-cuts were found on some skulls.

Isolated pit or crouched burials

Balcombe Quarry, Glynde, Sussex	M–LIA	(Burstow and Norris, 1962: 307–9; Burstow *et al.*, 1968: 22–4) One crouched female and infant found by workmen. (One Roman, male burial + boot nails)
Cassington Mill, Oxon.	E–LIA	(Note in *Oxonesia XVI*, 1951: 79; Harding, 1972: 68–9; Chambers, 1978: 256–7) One crouched female and child in primary fill of enclosure ditch. One crouched female in pit outside enclosure – possibly BA
Dorchester, Oxon.	EIA?	(*Oxonesia II*, 1937: 291; Harding, 1972: 68) One crouched male pit burial found by gravel diggers

London, Borough High Street, SE1	Late PRIA	(Dean and Hammerson, 1981) One male, on back, legs flexed, crossed at ankles, head north, sealed by Roman road
Redgate Hill, Norfolk	EIA?	(A. J. Lawson, pers. comm., Norfolk Archaeological Unit) One undated inhumation found in shallow ditch during road widening near Heacham, Norfolk.
Roudham, Norfolk	E–MIA?	(E. J. Rose, pers. comm., Norfolk Museums Service) One fragmentary female and infant in rectangular pit/grave with pots, flint, charcoal and animal bones
Standlake, Glos.		(Stone, 1857: 92–100, 1858: 213–19; Harding 1972: 68) One pit inhumation

An undated extended male inhumation was found at the base of a ditch near the salt-working site at Peldon, Essex (de Brisay, 1978: 31–60) with possibly a second fragmentary burial, cf. the extended female burial found at Billingborough (above) – also a salt-working site.

Conclusion

This study has attempted to make a reasonably comprehensive survey of the human skeletal material which has been found on Iron Age occupation sites in southern Britain, and by ordering and comparing the data, to discover if the material can throw any light on the treatment of the dead. Absence of a formal grave type has been assumed for the period in this region and, so far, settlements have been the main source of human remains. Settlements also potentially provide a background for the measurement of chronological change in the material, although the close dating of finds is a problem on many of the sites which have been examined. The settlements have been broadly divided into hillforts and smaller occupation sites, but more detailed differences in their social and economic positions have, at this stage, been ignored.

Two related themes have been discussed. The first is the possibility that the remains provide some evidence of native burial rites. The second concerns the theories which have been put forward to explain the appearance of the material found. These theories derive from Greek and Roman commentaries, from ethnographic sources, or simply arose as the result of observations made on individual sites. The classical authors reflected their own interests and points of contact with the Celts of western Europe in their literature. The treatment of victims slain or taken in battle, and the more accessible or lurid aspects of pagan religious cults therefore figure prominently, but the descriptions are concerned less with Britain than the Continent, where the martial preoccupations of the native population are confirmed by the chariots, weapons and other artefacts placed in their graves. The area of Britain which is being examined here lacks evidence of this kind, and also religious sanctuaries like Roquepertuse in southern France, which might indicate the nature of religious cults. It is tempting, and perhaps currently fashionable, to place less reliance on the classical authors than formerly was the case, and to seek explanations derived from the archaeological evidence itself. However, in some instances both the classical sources and ethnographic literature prove to be valuable supplements to the prehistoric data.

The suggestions which have a classical source – the existence of cults connected with the worship of decapitated heads and skulls, and the taking of heads of enemies as war trophies – were generally made in connection with the finds of isolated skulls and skull fragments. The evidence suggests that fragmentary cranial material tends to be found more frequently than fragmentary post-cranial bones. In one instance, Hunsbury, it seems quite possible that a skull was intended for display. While isolated crania and fragments are found both on hillforts and smaller settlements, the evidence for decapitation and removal of the head is largely confined to hillforts, in the massed deposits of bodies in rampart ditches (generally assumed to be battle casualties). However there are only three single inhumations which seem to have been headless, but otherwise complete on deposition and these have other features not present in the majority of single inhumations. From the evidence available, decapitation under non-military circumstances appears to have been unusual, which perhaps bears out suggestions that the isolated skulls are the result of trophy-taking. The origin of skulls found on smaller settlements could therefore have been battles away from the sites, although the possibility that they were the product of other ritual practice or an inhumation rite cannot be ruled out, in which case they may be the skulls of relatives and ancestors rather than those of enemies. The possibly trephined 'roundels' might indicate that at least some of the cranial material had a more immediately personal source, but it seems unlikely that the origin and ritual use of these, and the other worked skull pieces found, will ever be conclusively demonstrated.

The evidence for deliberate dismemberment of corpses is, again, largely confined to massacre sites in hillfort ramparts. There are a few examples, also mainly from hillforts, where individuals seem to have been dismembered and, in some cases, exposed in interior pits. But the relative infrequency of these isolated finds suggests that the practice was uncommon, and the remains may therefore be those of particularly important enemies, social offenders or sacrificial victims.

So far Salmonsbury is the only site which has been suggested as the possible scene of cannibal feast, and the evidence here is not conclusive. The recent excavations at Danebury will perhaps provide more detailed information about the practice of cannibalism in the British Iron Age.

Hillforts appear to be the centres of the more bloodthirsty and gruesome rites which have been suggested, and these, not surprisingly, seem to be directly related to warfare and retribution.

Crouched inhumations form the largest and most widely distributed group in this survey. Whimster recently suggested (1977a) that these burials should be regarded as a 'tradition'. The proposal was based on certain observed regularities, predominantly a crouched position with the body being laid on the left side, and the head directed between north and east. Variations in the material, e.g. deposition in graves rather than in pits, are described as 'related traditions'. He also suggested that these burials reflected an underlying native theme, which influenced the cist burials of the south-west and the Arras burials in Yorkshire.

Crouched inhumations are known from many cultures and periods, and cannot

therefore immediately be taken to represent a specifically native rite. However a crouched position is characteristic of British Neolithic and Early Bronze Age inhumations, and while continuity of tradition cannot be demonstrated, it is possible that knowledge of previous burial rites lingered on. The burials found on Iron Age settlements may not be a product of the only, or the most common, ritual employed, but whatever their origins or derivations they perhaps represent the most promising source of information about Iron Age burial practice in conditions where warfare and other abnormal social pressures were not a dominating factor.

It is perhaps worth repeating that for analytical and comparative purposes the sample available is extremely small, and is further limited in some cases by lack of detail in the excavation reports. While the features identified by Whimster are those which occur most frequently in the burials examined (see Table 3), there is considerable variability both in the side on which the body was laid, and in orientation. However, rather than considering these irregularities as mitigating against a uniform burial type, or as separate traditions, they might instead be regarded as variations on a theme. Ucko (1969) demonstrated the fallacy of assuming that similar grave types were the result of similar rituals. The converse also exists as a possibility, that a single rite might result in apparently dissimilar inhumation procedures. A possible explanation of both the variability and the casual or unceremonious nature of the burials might be that the act of interment was of less consequence than the preceding ritual. When the pre-inhumation rites were completed the body may have been seen to some extent as a waste product and disposed of accordingly.

The presence of inhumations in settlement areas was no doubt due to a change in custom. The evidence suggests that in the MIA the burials were more usually deposited on the edge of settlements, but by the LIA interior depositions predominated. It may be that prior to their appearance within occupation sites, the burials took place in the surrounding field systems. An alternative explanation is that the inhumations represent a new development. Secondary deposition has sometimes been suggested in connection with fragmentary skeletons and disarticulated bones which appear to have been interred as 'parcels'. Excarnation has also been suggested by writers to account for the absence of inhumations (see Ellison and Drewett, 1971; Cunliffe, 1974). This practice might not only provide an explanation for the phenomena described above, but also the isolated fragmentary material found, and the very tightly crouched burials. The rare examples of the exposure (or non-burial) of corpses in the interior of settlements seem to be associated with dismemberment, which, it has been argued here, was a relatively unusual rite with the specific function of insult to the deceased. Although no excarnation sites have yet been demonstrated for the Iron Age, evidence for their existence in the Neolithic period is becoming stronger. Hambledon Hill appears to have been a huge excarnation site and funerary complex, associated with an enclosed village *c.* 2700 BC (Mercer, 1980: 22–7).

Cremation is another possible explanation for the 'missing' burials. Its existence cannot of course be discounted; however, there is virtually no evidence of burning in the

skeletal material so far recovered from settlements, and fragmentary and disarticulated material found would seem to point to excarnation rather than cremation.

It is of course impossible to demonstrate the persistence of rites which leave few, or no, archaeological traces. It is however possible to see continuity of ritual practices and a mixture of disposal methods in the third and second millennia BC. In the Neolithic, excarnation seems to have been practised in parallel with crouched inhumation and the rite also appears to have been connected with the use of some causewayed enclosures. Cunliffe suggests (1974: 302) that similar social or religious foci continued to be used into the second millennium, some continuing 'to serve as tribal centres after the construction of hillforts within them'. Three crouched burials were found in the ditch silts of a round barrow on Earl's Farm Down, Wiltshire, which were dated to the Middle Bronze Age, when cremation was the normal rite (Christie, 1967: 358). Burgess has suggested (1974: 179) that possibly separate, urn using, cremating groups co-existed 'in the same areas, sometimes using common cemeteries'. Empty urns have been discovered in flat urn fields, and Bronze Age barrows have been excavated which contain no evidence of funerary practices. Also, as Burgess points out (1974: 218) the later stages of the Deverel-Rimbury culture are generally lacking in burials.

Excarnation may have lingered on as a minority rite during the period when cremation was the rule in southern Britain to surface again during the late Bronze Age. Similarly, the rituals concerning the final interment of cremations may have been abandoned. However, it would seem that by the MIA the customs resulting in the fragmentary skeletal material were breaking down. This may have been a result of increasing competition between social groups leading to difficulties in protecting or maintaining some ritual sites. If exposure was employed, the exposure period may have been shortened at this time, but, however nominal, it may at first have been given greater significance than the final burial. Eventually the inhumation rite may have gained in importance, resulting in the more recognisable formality of the 'Durotrigian' burials.

The evidence which has been examined here is open to many interpretations, but our knowledge of this apsect of Iron Age life will not be advanced unless suggestions are investigated in the light of existing data. Nor will the future recovery of human remains contribute towards a better understanding of their origins unless specific questions are asked. For example the incidence of the types of disarticulated and fragmentary bones found on settlements could be compared with ethnographic data on excarnated material. There are many sites where human bone has not been found. It may be that the remains were present but not recovered in excavation, or that the presence or absence of human bone on settlements is determined by cultural factors. The distribution of sites with and without skeletal material might be investigated, particularly their location with regard to hillforts, as the latter may have been the centre of local ritual practices, or determined their nature.

The study of the human remains found on Iron Age settlements has been neglected in the past, but it might well make a useful contribution to our understanding of social and religious life at this period.

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Abstract

There is an apparent absence of a native burial tradition in southern Britain during the Iron Age. However, inhumations and fragmentary skeletal material have been regularly recovered from settlement excavations, although these remains have seldom been considered as anything more than casual or accidental depositions. In recent years, the emphasis on the complete areal excavation of sites has added considerably to the number of such finds, and improved excavation techniques have enabled their stratigraphic relationships to be established with greater certainty.

This report describes and attempts an initial classification of the human skeletal remains found on a range of settlement sites. The material is examined in the light of previous suggestions to see how far these are supported by the evidence, and the possibility that the remains found on settlements might indicate the nature of a native burial tradition is also discussed. It seems that distinct trends are emerging which may provide a basis for the future investigation of this problem.

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Landscape Studies in Prehistory: Two Examples from Western Britain

by ROBIN HOLGATE and PAUL SMITH

Introduction

The landscape is the stage on which agrarian societies perform their day to day activities. Of these the agricultural practices and the nature and location of settlements and other types of site that they occupy and utilise vary considerably between different societies. This is due to many factors, which can be broadly divided into those assembling the environment and those relating to the way these are interpreted by man. Soil quality, altitude and aspect combine to influence the resulting vegetation cover and microclimate of an area, producing conditions potentially conducive to different patterns of land use and settlement. The manner in which an area is then developed and utilised is established by the interplay of various economic and social factors related to the needs of the people exploiting this area.

Of these two groups of factors, the character and texture of the landscape often play a large part in influencing the nature of the agricultural and settlement pattern that emerges in an area, a phenomenon that can be seen, for example, in the British landscape of today. In lowland areas, especially in East Anglia, arable farming is more widespread and associated with a nucleated pattern of settlement incorporating villages and large farms. Conversely the upland areas of the north and west are mainly given over to pastoral farming with a scatter of hamlets and small farms. The British landscape is thus one of considerable variety, and the density, location and nature of the farms and fields it supports changes in accordance with the composition and shape of its landscape. The relationship between the landscape, land use and settlement patterns is thus one worth investigating when studying agrarian societies.

Agrarian societies seldom confine all their activities to one site and often utilise a range of different site types, from fields and enclosures to occupation and ritual sites. When reconstructing the mechanics of these societies, we must look at the interrelationships of all the different sites in contemporary use, and not just concentrate on each type of site in isolation. A framework is required for such a study into which the position of all sites can be slotted in relation to one another. As we have already seen, the composition and shape of a landscape tends to reflect its associated land use and settlement pattern,

and is therefore a potential framework to use in analysing the relationships between contemporary, though functionally distinct, sites.

Recently, increasing attention has been paid to the region as the principal unit of synthesis in British archaeology (Wainwright, 1978: 20). In regional studies, the use of the landscape as a backdrop is not unknown: Fox's work in the Cambridge region (1923) earlier on this century attempted to relate the remains of past societies to their environmental background, and more recently, Fleming's work on the North Yorkshire moors (1976) and Dartmoor (1978) also illustrates the influence that the landscape has on man's activities.

In our work we have concentrated on how an analysis of the settings of sites within the landscape can throw more light on their nature and interrelationships. We have taken two geographically defined regions and examined the landscape settings of all the sites related to a specific prehistoric period within these areas, to show how such a study can produce a greater understanding of the concerns of past societies.

The Neolithic period in Anglesey

Anglesey is an island situated off the north-west coastline of Wales and has been isolated from the mainland since the end of the Great Ice Age. It is thus a naturally defined unit: a suitable laboratory for the study of past societies (Evans, 1973).

The bulk of our evidence for the Neolithic period on the island comes from the megalithic chambered monuments, of which the location of 36 are known, though 17 of these have been destroyed since the 1750s. Renfrew has suggested that these 'monuments functioned as territorial markers for segmentary societies' (1976: 204). If this was the case, we would expect the places where megaliths were located to be related to the land exploited by Neolithic people. A study of their setting in the landscape may therefore tell us more about how and where the people who constructed and utilised these monuments lived and worked.

Before proceeding further, the limitations of the archaeological record for the Neolithic period in Anglesey need to be outlined. First is the paucity of economic and settlement evidence. Only two settlements are known, and the distribution of stone axes and flintwork reflects where past collectors lived and where ploughing is evident, rather than the extent and nature of land exploited in the Neolithic. Second, a picture of how the environment has changed throughout the island's life cannot be fully reconstructed until more palaeo-environmental work has been done. The evidence presently available suggests that although the area of woodland was greater, the climate and soils prevailing throughout the Neolithic were not drastically dissimilar to those existing today. The third point relates to the destruction of megaliths, a phenomenon known to have taken place since the 16th century, due initially to the enclosure of open-field land. Even if the location of a reasonable number of megaliths is still available for study, either surviving or documented in antiquarian literature, an indeterminate number may have been destroyed. Finally, no radiocarbon dates are available for any of the megaliths on the island. In some

cases, architectural style and pottery recovered from excavations can tell us if a monument is from the earlier or later part of the Neolithic period. Beyond this, we cannot be more specific.

Studying the landscape setting of sites, unlike for example using Thiessen polygons, does not theoretically rely on having complete populations of contemporary sites or knowledge of the boundaries to exploited land for the period when these sites were in use. Anglesey's megaliths can therefore be used for such a study, though the four points outlined above will obviously have to be appreciated when interpreting the results from the study.

A visit was made to the place where a megalith is either standing or was known to have stood (see Fig. 1) and a record made of its setting (Holgate, 1980). The record consisted primarily of descriptions of the site on which the megalith has been built, its aspect, and the extent and nature of the land it overlooks. This information resulted in the division of Anglesey's megaliths into six main groups on the basis of their landscape setting. These groups appear to be spatially – and in some cases temporally - - distinct, as summarised in Table 1.

Table 1

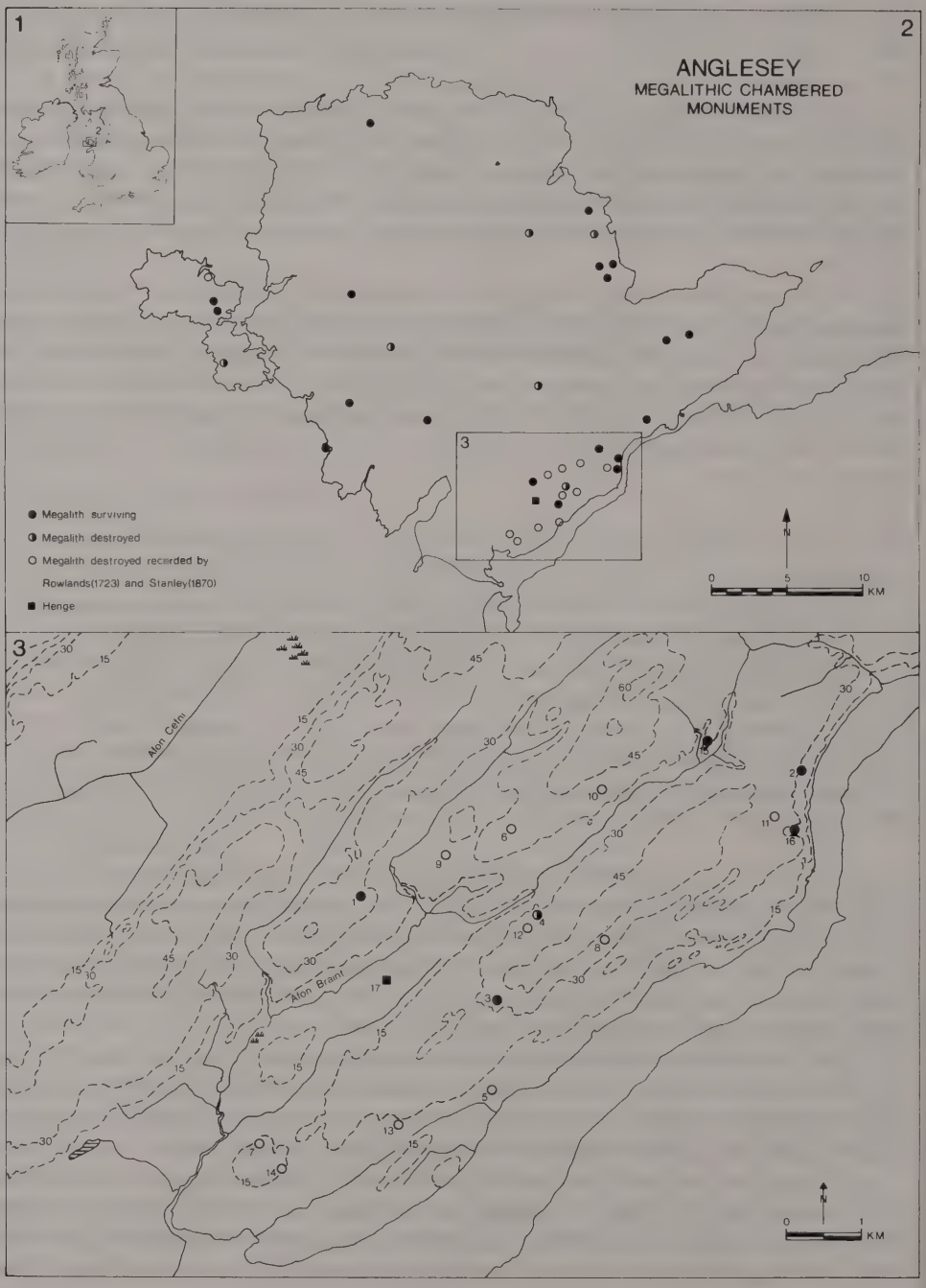
		Region	Date
1.	On ridge crests	West and South-west	Earlier and later Neolithic
2.	Immediately below ridge crests	East	Earlier Neolithic
3.	On valley sides	West and South-west	Earlier Neolithic?
4.	On slopes below ridges	East and South	Earlier Neolithic
5.	On the bottom of bowl-shaped basins	North-west	Earlier Neolithic?
6.	In valley bottoms	South	Later Neolithic

The question mark refers to megaliths which have not undergone excavation to confirm the date of their construction and use.

This spatial pattern produced reflects the different physical regions on the island. In the north-west region megaliths are located in the bottom of bowl-shaped basins. Apart from a range of rocky hills running east to west in the north of this region, separating off a coastal belt of low base status brown earth soils, the area is covered by a thick mantle of glacial drift over which dendritic rivers radially flow. Its undulating surface supports poorly drained gleyed brown earth and gley soils.

The region below this (labelled west and south-west in Table 1) is given over to ridges supporting low base status brown earth soils with valleys and basins in between containing poorly drained gleyed brown earth and gley soils. Here, megaliths are either located on the crest of these ridges, or on the north-facing sides of valleys.

The eastern and southern regions have similar physical characteristics to one another, both predominantly consisting of north-east to south-west running ridges composed principally of carboniferous limestone, supporting both high and low base status brown earth soils. A trellised drainage pattern is present in both areas, though some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of the valleys in the south (particularly that of Afon Braint) were widened by glacial melt water, a process that created many small landforms on the valley floor. These valleys contain poorly drained gleyed brown earth and gley soils. The earlier Neolithic monuments in these two regions are set either immediately below a ridge crest or on slopes below a ridge, while those of later Neolithic date in the south are positioned in valleys, either directly on the floor or on glacially derived landforms in the bottom of the valleys.

The landscape settings of Anglesey's megaliths appear to be mirroring the physical appearance of the landscape in which they are set. It is possible that this association is a fluke of the survival of monuments in these settings, but this is unlikely. The building of stone walls around fields has accounted for the destruction of most megaliths whose demolition has been recorded. However in the south-eastern half of the island, the majority of past and present intensive farming lies on the slopes of interfluves, precisely where earlier megaliths are located. Agricultural activity in this region may therefore have reduced the number of megaliths originally constructed, but it has probably had little effect on restricting the range of settings known to have been used for their location. Conversely, agricultural activity is minimal on higher ground in the north-west. As Bronze Age cairns still survive on crests and slopes in this region, it is reasonable to assume that at least one megalith would have survived in such positions, if these settings had been employed in this area. Thus the association between the physical characteristics of the region within which megaliths have been located and their settings within this landscape is probably representative for the original megalithic population in Anglesey, and worthy of further investigation.

The composition and shape of the landscape – though they are not the sole factors involved – have a considerable influence on the agricultural and settlement pattern in a given region. The surface of Anglesey today displays this: the south-eastern half of the island supports larger farms and more cultivated land than the north-western half, where farms are smaller and more dispersed and the majority of farmland is devoted to pasture. It is therefore possible that in different landscapes, where the settings chosen for megaliths varies, the Neolithic pattern of land use and settlement also differed.

Unfortunately, there is little comparative evidence of Neolithic economy and settlement from the different regions of Anglesey to support this suggestion, the southern part of the island being the only portion from which a reasonable quantity of Neolithic material other than megaliths and their associated artefacts has been recovered. However, this material can be used to demonstrate whether or not it is possible for the landscape settings of megaliths in this part of the island to be related to Neolithic land use and settlement, and it is this region which will now be looked at.

Fig. 1 Megalithic chambered monuments in Anglesey. Contours in metres above OD. Legend: 1, Bodowyr; 2, Plas Newydd; 3, Perthiduon; 4, Carreg-y-Fran; 5, Barras; 6, Bodlew; 7, Cae'r Llechau; 8, Gwydryn; 9, Llyslew; 10, Rhos y Cerrig; 11, Tyddyn Caesar; 12, Cae'r Nant; 13, Lôn Cae Rau Mawr; 14, Tan Twr; 15, Bryn Celli Ddu; 16, Bryn yr Hen Bobl; 17, Castell Bryn-Gwyn.

The location of megaliths in southern Anglesey is shown in Fig. 1. Those surviving today can be approximately dated, but for those recorded by Rowlands (1723) and Stanley (1870), no dating is possible. On architectural style, Bodowyr (1), Plas Newydd (2), Perthiduon (3) and Carreg-y-Fran (4) are probably earlier Neolithic in date, and all are set on slopes below ridges, thus having a 270° maximum angle of view. The later Neolithic monuments – Bryn Celli Ddu (15) and Bryn yr Hen Bobl (16) – have both been excavated. The former covers a dismantled henge, while the latter partially overlies an earlier Neolithic settlement. They are located in the bottom of valleys: Bryn Celli Ddu on a spur and Bryn yr Hen Bobl directly on the floor of a dry valley. Another henge – Castell Bryn-Gwyn (17) – is situated to the west of Bryn Celli Ddu, further down the Braint valley, within which evidence of later Neolithic occupation has been found. Either this monument went out of use, as did the one at Bryn Celli Ddu, to be reused as a settlement, or we have a henge that displays a settlement function among the many other uses to which it may have been put.

Excavations at Bryn yr Hen Bobl recovered a fair quantity of economic data (Hemp, 1936). The animal bones indicated that cattle, sheep and pigs were kept on the island during the Neolithic; marine mollusca showed that marine resources featured in the diet of Neolithic people; hazelnuts had been gathered, presumably for eating; oak, hazel, ash, willow, alder, birch, maple and hawthorn charcoal testified to the range of woodland resources available. Unfortunately, no seed remains were recovered, so we have no information on the crops that may have been cultivated by these Neolithic farmers. Although a full reconstruction of the economy and diet of Neolithic people living in southern Anglesey cannot be produced from this, one point of significance to emerge is that agriculture did not produce all the food requirements for the people associated with the Bryn yr Hen Bobl settlement.

Turning now to the evidence for Neolithic settlement, we have two sites and a collection of stone and flint artefacts that have been retrieved from ploughed fields in southern Anglesey (see Fig. 2). Both settlements are set in the bottom of valleys, on reasonably well-drained land. The flintwork recovered from ploughed fields does not indicate the location of any more Neolithic settlements. Several ploughings may be required to bring flintwork from occupation layers to the surface of a field, perpetuating the possibility of settlements still lying in fields presently under cultivation, but the chances of this are remote. It could be significant therefore that most ploughed fields lie on the crests and slopes of interfluves. It is feasible that denudation processes have transported any settlement debris from ploughed valley sides to the foot of these slopes. However, it is doubtful whether these processes acting in Anglesey have been sufficient to totally remove all settlement evidence from valley sides.

Present Neolithic settlement remains from southern Anglesey therefore suggest that settlements were sited on well-drained land in the bottom of valleys. By looking at the pattern of the landscape settings employed for settlement sites and those used for megaliths, we can tentatively show how the landscape in this area was exploited by people living in the earlier Neolithic period.

Fig. 2 Flintwork and settlement evidence in southern Anglesey. Contours in metres above OD.

For the earlier Neolithic in southern Anglesey, megaliths were set on slopes below ridges and settlements were probably located in valley bottoms, leaving the sides and crests of the valleys unoccupied by either of these site types. The valley sides would have first supported woodland, but as they also support well-drained, high and low base status brown earth soils, they would have provided the best setting for cultivated fields. Some areas of woodland, possibly coppiced, may have been left in places to provide wood for fuel, artefacts, buildings and other structures. Remaining land in the bottom of valleys and on slopes may have been used as pasture on which to graze animals. Finally the crests of ridges, as illustrated by the road network of today, provide good routeways for communication and trade purposes and may have been used as such in the Neolithic period.

For those who want to see a direct link between the settings of settlements and megaliths, intervisibility between these two types of site may have been established by Neolithic people. The site of Tyddyn Caesar (11), a destroyed megalith recorded by Rowlands (1723: 93) was probably intervisible with the earlier Neolithic settlement at Bryn yr Hen Bobl and may have been acting as a 'territorial marker' for the community living here. However, speculations along these lines should await the discovery of the location and nature of more Neolithic settlements in the area.

The later Neolithic in southern Anglesey saw a change in the setting chosen for megaliths, though settlements probably retained their setting in valley bottoms. Two henges were also constructed in the Braint Valley, at least one of which – Bryn Celli Ddu – later became redundant and was replaced by a passage grave. This may not represent a totally new pattern of land use, economy and settlement in the later Neolithic, but changes in other aspects of society, as exemplified by social organisation and religion.

To conclude this section, three points will be highlighted. First, it has been shown that the landscape settings of Anglesey's megaliths are probably related to Neolithic land use and settlement, and that the setting of Neolithic sites in Anglesey can be used as an indicator to the pattern of life throughout this period on the island. Second, we really need to discover more Neolithic settlements and find out what these can tell us about how people organised themselves during this period before we can be sure that we are correctly reconstructing the functions of megaliths and the part they played in the lives of the people who built and used them. Finally, limited economic, palaeo-environmental and settlement evidence from the whole of Anglesey prevents a fuller reconstruction of Neolithic life on the island. However, the landscape framework into which the setting of sites can be fitted is predictive in nature, in that it leads to the perception of where other sites, for example fields and settlements, could have been located, and in some instances it may be possible for these locations to be confirmed or disproved by field survey and palynological work. If it cannot provide the immediate panacea to the Neolithic archaeology of Anglesey, it at least provides a mental map of Neolithic activity on the island, and suggestions as to where further evidence of Neolithic occupation may be found.

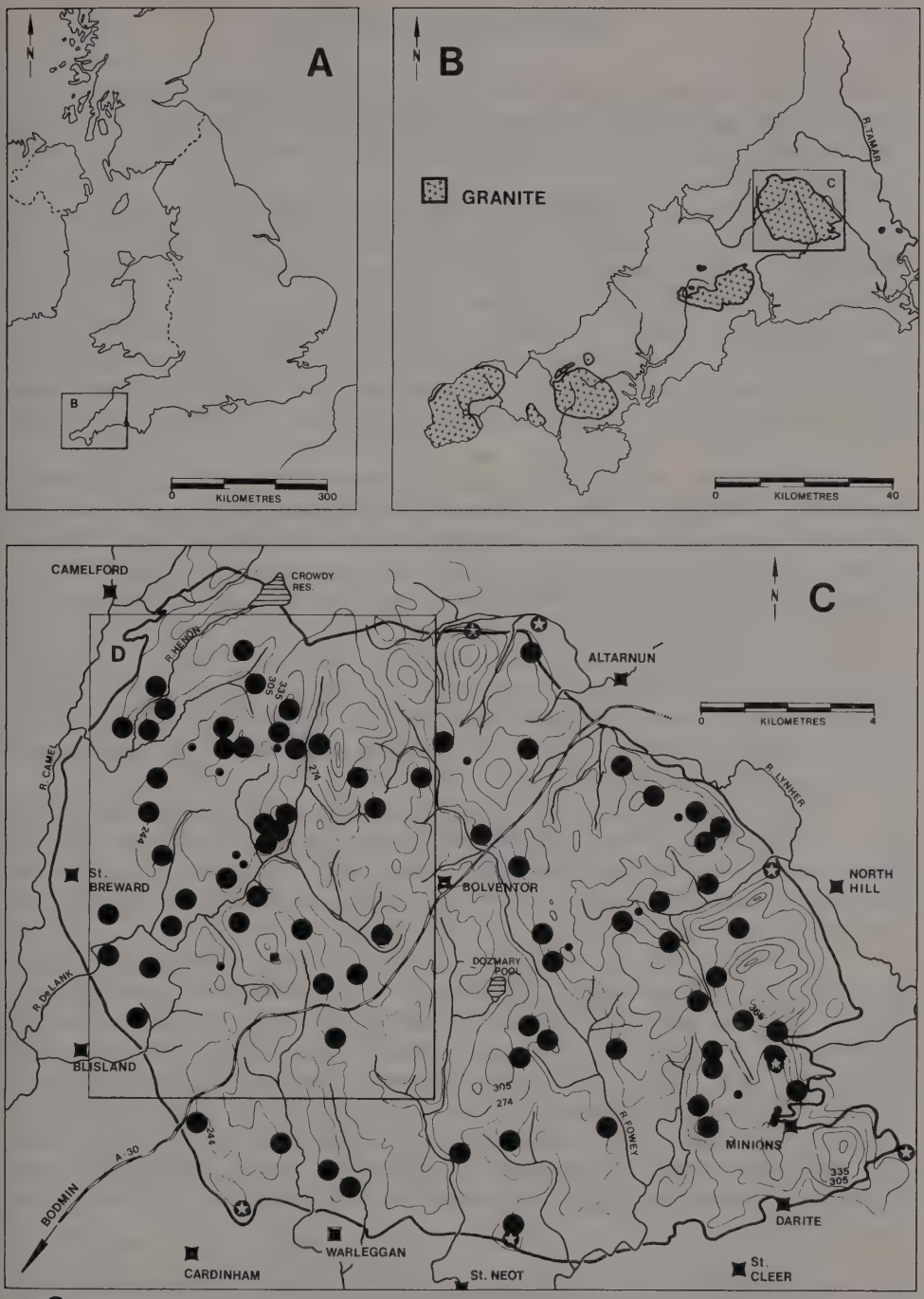
Later prehistoric settlement on Bodmin Moor, Cornwall: the De Lank river zone

Bodmin Moor retains a wealth of prehistoric remains which often survive in an exceptionally good state of preservation. In 1975 the author selected a suitable area on which a discrete regional study of settlement sites could be based. The area chosen covers 88 km^2 (much of the western half of the moor) and in this paper is referred to as the De Lank river zone, as it is almost bisected by this major moorland water course.

The selected zone was investigated using aerial photographs and Ordnance Survey records combined with both extensive and intensive field survey, and the information gained was used to make a morphological and locational study of the prehistoric settlement remains. Over 30 settlement sites containing a total of about 700 hut circles, six simple stone circles, a circle henge, over 100 cairns and barrows and a possible prehistoric banked enclosure, are contained within the De Lank zone. This study has brought to light a number of previously unrecorded sites, and the extent of many known sites has been extended by detailed ground survey.

The direct evidence for later prehistoric occupation of the De Lank zone is extensive, consisting of groups of circular and oval buildings. In many cases these structures are

Fig. 3 Distribution of huts and socio/ceremonial monuments on Bodmin Moor, Cornwall. Major modern settlements also shown. Contours in metres above OD.


A
B
0 KILOMETRES 300
B
GRANITE
R. TAMAR
C
0 KILOMETRES 40
C
D
CAMELFORD
CROWDY RES.
R. MEDON
ALTARNUN
0 KILOMETRES 4
R. CAMEL
R. LYNHER
St. BREWARD
BOLVENTOR
NORTH HILL
DOZMARY POOL
R. DELANK
BLISLAND
R. FOWEY
MINIONS
BODMIN
A 30
DARITE
WARLEGGAN
CARDINHAM
St. NEOT
St. CLEER
Hut Settlement
Hill Fort
Henge
Stone Circle

associated with enclosures which exhibit a variety of morphological characteristics and some of these can be traced over extensive areas of land. This large-scale above-ground preservation is largely due to the underlying geology: the granite batholith which forms most of Bodmin Moor.

The moor consists of gently undulating, broad, rounded hills (known locally as 'downs') which are divided by wide, flat-bottomed valleys. These broad tracts of 'subdued relief' (Marr, 1920) are visually dominated by the tors – shattered peaks of tougher intrusive granite – which, although diminutive as highland peaks, rise abruptly and dramatically from a fairly level plateau. This plateau, the 1,000 ft platform (Barrow, 1908), is an important influence on the moorland drainage system. Most of the moorland rivers rise on it, and because of its level character, flow sluggishly at the beginning of their courses. This causes headwaters to expand over the ground surface, forming extensive marshy areas.

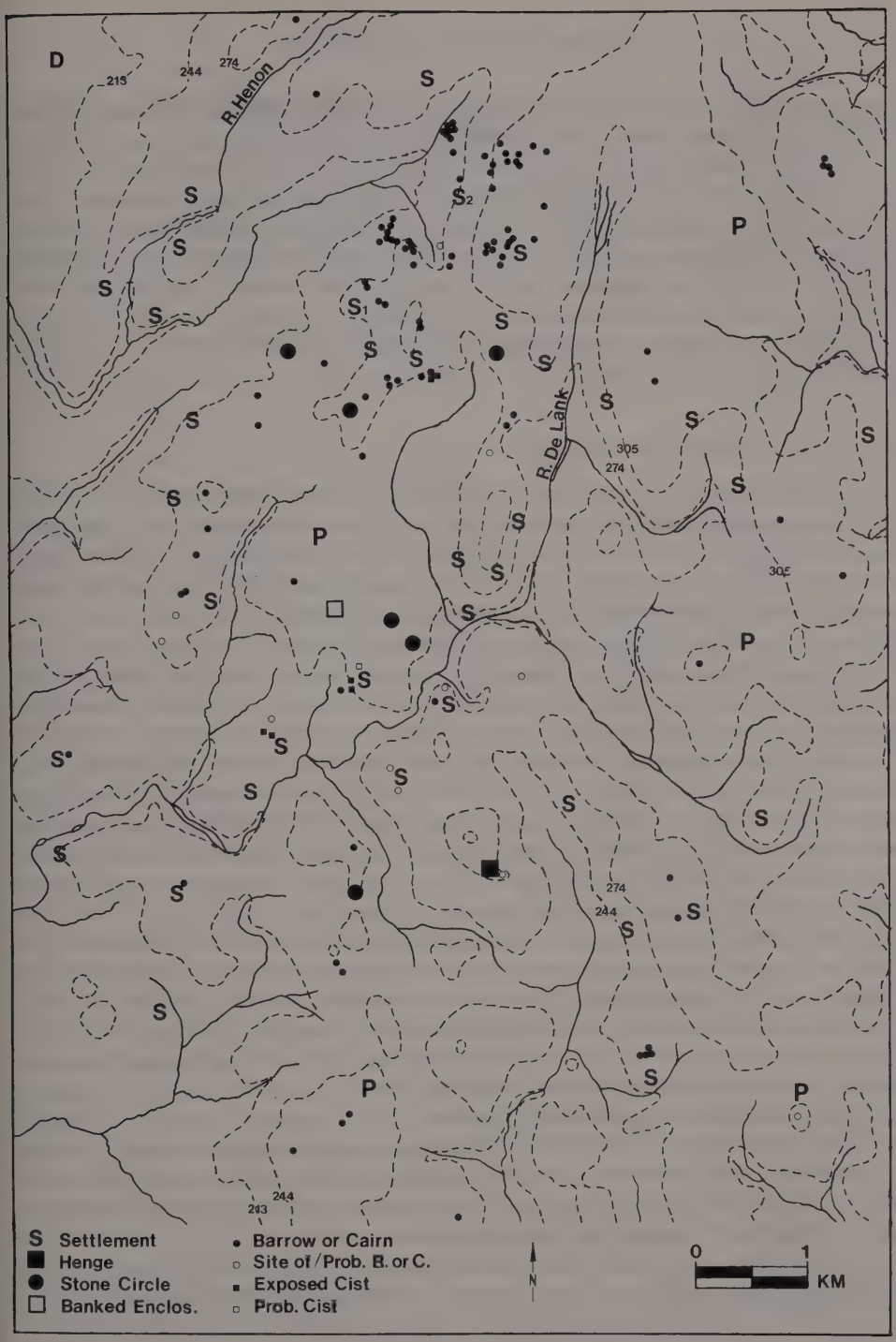
Another feature of the granite moorland is the extensive spreads of granite boulders and smaller debris called 'clitter' or 'moorstone' which has been the source of easily obtainable building material since at least the Neolithic. The clitter fans out around the parent tors in thick bands and often occurs in quantity on some downs and on the sides of river valleys, having been produced by periglacial freeze and thaw conditions and then transported downhill by solifluxion.

There is a tendency for the settlements in the De Lank river zone to be distributed along the main river valleys on the crests of downs and on valley slopes, and to cluster at headwaters and on the lower slopes of tors. The settlement distribution over the moor as a whole displays similar characteristics to those observed in the De Lank study zone and echoes the radial drainage pattern of the moor.

The number of the settlements situated close to headwaters and adjacent to or on the 1,000 ft platform is considerably greater than those situated at lower altitudes in the area. This is perhaps an indication that altitude, precipitation and presumably the resulting microenvironments, may have had some positive influence on the siting, form and size of some settlements.

The average rainfall in the De Lank area rises with altitude from west (1,300 mm per annum) to east, being highest (1,800 mm per annum) in the north-eastern portion of the zone over the large bulks of Rough Tor and Brown Willy, and the data show that more than twice the number of settlements exist within the 1,600–1,800 mm inclusive range, than in the 1,300–1,500 mm range. The total number of hut circles in the higher precipitation range is also significantly greater: about 600 huts in contrast to about 100 huts in the lower range. The greater vulnerability of the lower altitude sites to destruction and fragmentation due to enclosure, clearance and general robbing, may possibly account in part for this pronounced difference. However, the better preserved of the lower altitude

Fig. 4 The De Lank study area showing hut settlements and socio/ceremonial sites. P indicates those areas which may have provided permanent grazing during the second millennium BC. Contours in metres above OD.


D
R.Henon
R.De Lank
S Settlement
Henge
Stone Circle
Banked Enclos.
Barrow or Cairn
Site of / Prob. B. or C.
Exposed Cist
Prob. Cist
N
0
1
KM

and precipitation range sites exhibit little evidence of ever having been as densely populated with buildings as many of those in the higher areas.

Pollen evidence from several locations on Bodmin Moor (Conolly *et al.*, 1950; Brown, 1977; Clews, 1977) indicate that differing microenvironments prevailed in the higher and lower altitude ranges. The difference in settlement size within these ranges invokes the question of whether there are any other visible characteristics of the sites which may provide information about the cultural, chronological and environmental relationships between the higher and lower range sites.

Using morphological characteristics, the settlements in the De Lank study zone can be divided into five main type groups.

Group A: Integrated angular settlements

In this type the various boundary walls combine to form an integrated, fairly regular series of enclosures, angular to sub-angular in shape. These enclosures are often formed by quite insubstantial walling which in some examples may have been no more than linear clearance heaps, while others were clearly constructed of laid stones. Some of the better preserved group A settlements contain about a dozen buildings, though both fewer and greater numbers of hut circles can occur on sites of this group.

These settlements may in general be compared to the 'Gwithian/Trewey Foage chequerboard' type sites (Thomas, 1978: 10) which occur in the western areas of the county, and to similar sites on Dartmoor. The immensely important excavations at Gwithian (Megaw *et al.*, 1961; Thomas, 1970, 1978; Megaw, 1976) and reappraisal of the pottery recovered from other sites has led Thomas (1978: 8) to state that many of these sites almost certainly lie 'within a post-Beaker, "Early/Middle" Bronze Age continuum covering the second millennium'. It is to this period that the majority of group A settlements in the De Lank zone should be tentatively assigned on morphological grounds until future excavation work can provide more evidence.

The group A settlements are mostly situated either on the crests of downs or on the slopes of the lower river valleys. Most of the downs are very exposed and also poorly drained, but their broad, slightly rounded contours seem to offer a suitable basis on which to form the fairly small, regular enclosures which are characteristic of the group A sites. An unobstructed view, often over extensive tracts of surrounding land, can also regularly be obtained from within the settlement areas.

The downs are often relatively free from large quantities of clitter, but although this would have been an advantage where tillage or heavy grazing was concerned, it would have imposed some limitations on the potential settlement size. This may to some extent account for the relatively low density of buildings on these sites, and also for the rather slight forms of enclosure walling normally present.

The exposed, moist downs during sub-boreal times were probably covered in hazel, oak and alder scrub which could have been easily cleared to facilitate settlement construction. In fact, the shape and size of the group A enclosures could stem from the piecemeal

scrub clearance followed by the construction of walls from cleared clitter. Most group A sites would have had immediate access to the mixed oak woodlands in the lower river valleys and to the more open oak stands on the sheltered slopes of the downs. However, the latter would probably have been cleared during the earliest phase of settlement establishment, as excavations at Stannon Down (Mercer, 1970) and at Holne Moor, Dartmoor (Fleming, 1979), have shown that timber was an important building resource. From the evidence found at Holne Moor (Fleming, *ibid.*), it seems reasonable to surmise that timber buildings may have existed on the Bodmin Moor sites. This could considerably increase the number of hut circles at present known to exist at some settlements, especially in these lower zone sites where timber was undoubtedly close at hand and in plentiful supply.

Group B: Integrated parallel linear settlements

These sites are formed by a series of pronounced linear enclosures running approximately parallel to each other, with a minimum overall length five times greater than their width. Subdivisions within the length of the 'strips' may often create smaller internal enclosures from the main parallel system.

When these linear systems occur on a very extensive scale, and conform to the characteristics described by Fleming (1978) they can be called 'parallel reave systems', although the reaves so far noted in the De Lank study area do appear to differ slightly in character to those found on Dartmoor. The group B type of enclosure system can be compared to numerous examples of 'Celtic fields' in many parts of the British Isles, both in the highland and lowland zones, which seem to date from the Neolithic to the Romano-British periods. Although many variations exist, the basic theme of primary 'strip' enclosures can often be discerned.

A dated example of a group B type complex is available from the study zone. At Stannon Down (see Fig. 4, S1) (Mercer, 1970) two separate phases of occupation were observed. The latter phase, dated to about 1200–1000 BC, belonged to the visible settlement composed of huts and parallel linear enclosures of rather irregular width. The 'strips' ran with the contour and Mercer (1978: 168) concluded that if cultivation had been carried out, it was probably performed by hand due to the restrictions imposed by the small size of enclosures. The mutilated fragments of two more possible parallel walls were discovered which must have belonged to the earlier phase of settlement, dated to within a bracket of about 2000–1500 BC. This evidence thus appears to indicate the possible utilisation of a form of small, parallel system on Bodmin Moor during the formal 'Late Neolithic/Early Bronze Age' which continued in similar form throughout the second millennium and probably into the first millennium BC.

Most of the group B sites were once thought to be entirely Medieval in origin. Relationships between hut circles, known prehistoric enclosures and these 'Medieval' fields now indicate, however, that although many were certainly utilised and adapted during the Medieval period, there is a real probability that their origins lie in prehistory.

Although group B sites are sometimes found on downs, they show a preference for

the steeper slopes of tors, perhaps taking advantage of the better drained, organically richer creep and downwash soils which build up on the lower slopes below the thick streams of block clitter. A preference is also shown for a location on the river side of these slopes from where they could easily exploit the river and river valley resources.

Heavy exploitation of the birch and alder woods which colonised the river valleys in these upper reaches and of the open oak stands which occurred on sheltered tor slopes would have taken place, with the more exposed scarps and clitter slopes in the vicinity of the settlements probably being cleared of their dwarf oak and scrub cover quite rapidly.

Group C: Fragmented settlements

In this group the main enclosures tend to be detached from each other. Compound enclosures can often occur, but the underlying pattern of segregated enclosures which give the settlements their rather loose-knit, unplanned appearance, is usually retained. The settlement walls are frequently of curvilinear and varilinear form, and can be quite substantial. Single, isolated enclosures have been included in this group as they are normally comparable in character to the enclosures of group C sites in general.

Many of these settlements have very large numbers of buildings on them, far more than are found in the two preceding groups. Rough Tor west (see Fig. 4, S2), for example, has no less than 150 hut circles covering an area of about 30 ha (74 acres) and sites with between 40 and 50 buildings are common. The buildings can be contiguous with the enclosure walls, or free-standing both inside and outside the enclosures.

Parallels can be found for most of these settlements on Dartmoor (Fox, 1957; Price, 1977; Worth, 1953) where they also congregate in the upper reaches of the river valleys. Evidence from the Dartmoor sites indicates a Bronze Age date for these settlements, with a probable continuation into at least the early Iron Age. Many of the De Lank group C settlements exhibit several phases of building and were probably occupied, though not necessarily permanently, for a long period. Most of these sites cluster around headwaters, and appear to have been purposely sited amongst large areas of clitter, which (other factors permitting) provided a high expansion potential for these settlements.

Although the actual location of these settlements appears to have been carefully chosen with a due regard to natural drainage, extensive bogs occur in their immediate vicinity due to the character of the 1,000 ft platform. Some of these marsh areas have clearly been important to man from an early period. Dozmary Pool (Wainwright, 1960) and Crowdy Marsh (Trudigan, 1977a, b) which are both just outside the study zone, show evidence of extensive occupation around their margins during the Mesolithic period and as Evans (1975: 101) points out, 'the advantage of these marginal zones between major ecological communities, sometimes call "ecotones", is well known, and we should not be surprised to see them being colonised as they were created'.

In the second millennium BC these marsh-edge areas must have been an important resource zone for fodder. They would have provided varied 'flush' grazing, while the presence of some calcium enriched species (Brewster, 1975) could have helped to alleviate

the problem of calcium deficiency, a once common ailment in cattle, especially in highland regions. There is also a definite possibility that, from the Bronze Age onwards, stream tin deposits within these bogs were extensively exploited (Barrow, 1908). This may have been an important, if not the most important, factor in the establishment and location of some of these group C sites.

Group D: Fractional linked settlements

These are settlements where apparently random 'rickles' of insubstantial walling link a number of buildings or form very small, irregular and often incomplete enclosures.

Evidence of this type of site occurs throughout the survey area and in a number of cases where chronological depth can be recognised, the group D remains appear to be earlier than the main, overlying settlement complex. This may indicate that a more uniform ground-level climate, or economic basis, existed during the major period of this group's existence.

Group E: Unenclosed, free-standing settlements

On these sites, buildings are free standing and do not have any visible enclosure walling. Definite examples in the study zone are limited, but as many free-standing buildings occur in other settlement groups, especially group C, the possibility that hut circles of group E sites have either been included in later settlement forms, or added to earlier ones, cannot be ruled out.

Little can confidently be said at the present time concerning the possible economic basis of the settlement groups outlined above. Many assumptions can be made using evidence from lowland settlements, but these may bear little economic resemblance to the upland, exposed, acid soil sites of Bodmin Moor. Although Gwithian appears to provide a perfectly good model for the form of group A sites, it may be misleading to automatically conclude that the same function (i.e. that of a true arable field system) can also be inferred. The environment of Gwithian and the granite sites differed considerably and this may have induced different functional patterns. Many group A sites are, for instance, located on poorly drained, extremely exposed downs which would probably have been unsuitable for growing cereals even during the Bronze Age.

As Smith (1975: 27) points out, 'there are certainly many geometric layouts suggestive of fields, and while those associated with plough terraces were obviously cultivated, it is unwise to assume that all enclosed areas served this function'. Some possible lynchets can be seen on a number of these sites, but they are mostly very slight indeed, and could just as easily have been caused by natural or stock-induced soil creep, as by tillage. Many of the group B enclosures do exhibit good lynchets, but as most of these sites have been utilised and adapted by Medieval farmers, they cannot be positively accepted as prehistoric in origin. Signs of Medieval tillage exist today around the 305 m (1,000 ft) contour, showing that arable fields could have been present, up to this altitude at least, in the Bronze Age.

Enclosures of the group C type are normally called 'pounds' and the subliminal connotations attached to this word seem to have convinced many prehistorians that form equals function. Because of this, sites of this type have often been classified as 'pastoral'. Recently though, Price and Tinsley (1976), by confirming that some lynchetting was present in the pounds at Trowlesworth, Dartmoor, revived Curwen's (1927, 1938) early argument that many of the smaller 'pounds' may have been corn plots. However, the extensive 'common' pasture areas (which will be discussed in the following section) show that pastoral farming must have played a very important role in the overall economy of the moor during the Bronze Age, while the possible importance of industrial practices must also be taken into account.

The settlement distribution pattern already described produces irregular 'mesh' areas of apparently unsettled land within a 'network' of settlement sites. The absence of settlements in these areas has been verified by detailed fieldwork carried out by the author. These 'mesh' areas correspond in the main to the interior of the gently rolling high plateau lying between the river systems, which comprises much of the present unenclosed 'common' grazing land. This suggests that clearance and enclosure cannot be said to account greatly for the lack of settlement evidence in these areas.

Structures normally classified as having a socio/ceremonial purpose, that is, stone circles, cairns and barrows, exist within these zones and it is noticeable that in the De Lank study region, the stone circles are located on the periphery of the 'mesh' areas, and close to the visible settlements. Most of the stone circles on the moor in general are similarly located. Burl (1976: 115), in reference to the Bodmin Moor circles, states that 'they are close enough together to be local centres rather than foci for widely dispersed groups'. If this were the case then there is also a possibility that these structures, in some instances at least, may have been employed as local demarcation symbols standing in a cultural 'ecotone' between individual or grouped settlements and the extensive open terrain of the 'mesh' areas.

Fleming has pointed to a similar situation occurring on Dartmoor, where stone rows rather than stone circles appear to be located 'just inside a zone of permanent pasture' (Fleming, 1978: 109). He also found that this zone, at some time during the second millennium BC, was formerly bounded by reaves, and this more rigid demarcation of 'mesh' areas can also be recognised in the De Lank zone and on Bodmin Moor in general.

It appears then that these 'mesh' areas were probably zones of permanent pasture and may have been 'common' grazing areas belonging to groups of settlements. These settlement groups were probably formed within the natural discrete territories carved out by the river valleys which are comparable to some present day parishes. Some barrows and cairns lying within the 'common' zones may have delineated more elastic internal grassland management boundaries.

Other reaves directly associated with some of the group A settlements, and often bounding an area of about 1 km^2 around the settlement, may represent the delineation of an 'infield/outfield' system from the 'common' zone. This extensive 'common' grassland management, and the possible individually discrete 'infield/outfield' system must be

viewed in conjunction with the three major settlement groups (A, B and C). These may have been roughly contemporary, occupying distinct, though overlapping 'niches' in the landscape, with each group playing an essential role in an articulated land use structure.

The almost self-perpetuating continuity of extensive 'common' land areas and their possible origins have been discussed by Hoskins, who remarked that 'common rights . . . probably antedate the idea of private property in land and are therefore of vast antiquity' (Hoskins and Stamp, 1963: 6). This study shows that detailed archaeological survey of a suitable area, combined with a due regard of the importance of the landscape, its influence on and exploitation by prehistoric peoples, can reveal physical evidence which puts flesh on the bones of Hoskins' statement.

Conclusion

The landscape of the area in which communities live has an influence on the activities they perform. By analysing the landscape settings chosen for the sites of these activities, the reconstruction of the land use and settlement patterns of past communities is sometimes possible, as illustrated by the two examples described in this paper.

These two studies were carried out on a regional basis, but not to the exclusion of extra-regional activities or other methods of analysing archaeological material. The Bodmin Moor study, for example, demonstrated how the morphological analysis of settlements, combined with the landscape setting approach, is a method that can be used for reconstructing later prehistoric economy and land use on the moor.

Few archaeological studies are fortunate enough to have been able to draw on total populations of contemporary sites and artefacts. The landscape approach can make use of incomplete populations and by doing so can provide a means of testing the suggestions it puts forward. For the area and period under study, it produces a mental map of how man developed and utilised the landscape around him. This perceives the use to which different landscape settings were put and thus predicts where the sites of certain activities could have been located. These places can then be examined for other forms of evidence that show whether or not these activities were once performed there. The valleys in southern Anglesey provide an example of this, as they should be investigated for further Neolithic settlement evidence to substantiate the views expressed in this paper.

The natural beauty of many landscapes is a source of inspiration and pleasure to many of us. Today, some people can become enamoured by a place to the extent that they will decide to live there without considering economic and other factors. In writing about prehistoric ritual sites and their location in the landscape, Lynch suggests 'that we may legitimately use the detail of their siting and their relationship to striking natural features to illuminate that elusive aspect of prehistoric man, his sensibility' (1975: 126). This may be so. Unfortunately we cannot read the minds of these people to discover precisely why a particular type of site was located where it was, and all the uses to which the site was put. However, the landscape can be read, and in some cases may take us nearer to these objectives, and throw more light on the lives of past societies.

Acknowledgements

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Abstract

This paper provides two case studies which illustrate how the study of the landscape setting of sites can be used in reconstructing the economic, land use and settlement patterns of past agrarian societies.

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Rehman Dheri and the Birth of Civilisation in Pakistan

by FARZAND ALI DURRANI

The site of Rehman Dheri was discovered by a team from the Department of Archaeology led by Dr A. H. Dani (1971), and is being excavated jointly by the Departments of Archaeology of Peshawar University and the Government of Pakistan under the direction of the author since 1975.

Rehman Dheri is in National Grid C9054271 and is situated 14 miles (23 km) north of Dera Ismail Khan city (Fig. 1), latitude 31.50 N, longitude 70.54 E, about 1 mile (1.6 km) to the west of the Dera Ismail Khan–Bannu highway on the Gomal Plain (Fig. 1).

Climate and vegetation

The climate of the Gomal plain is subtropical, continental, arid/semi-arid, characterised by long hot summers and short cool winters. Because of the continental location, there are extremes in temperatures. The summers are hot; the mean daily maximum temperature is usually above 90°F (32°C) during the day for nearly seven months from April to October, while 100°F (38°C) and above is recorded for May, June, July and August. Winters are short and fairly cold, but the temperature never drops below the freezing point. January is the coldest month and records a mean daily temperature of 53°F (12°C). Mean yearly precipitation averages from 9 in (23 cm) in the north to 7 in (18 cm) in the south. The rainfall is received in two well-marked seasons: 45% of the annual rain is received from the summer monsoons during July and August, while the western disturbances are responsible for 30% of the annual rain which is received mainly in winter. The high temperature, low amount of precipitation, and its poor seasonal distribution and low humidities prevalent throughout the area provide a natural barrier to agricultural development and directly determine the distribution of population and human settlements.

On account of low rainfall and higher evaporation the natural vegetation is poor. Most of this has been cleared for fuel, grazing, or cultivation. Today the natural vegetation survives only in scattered patches.

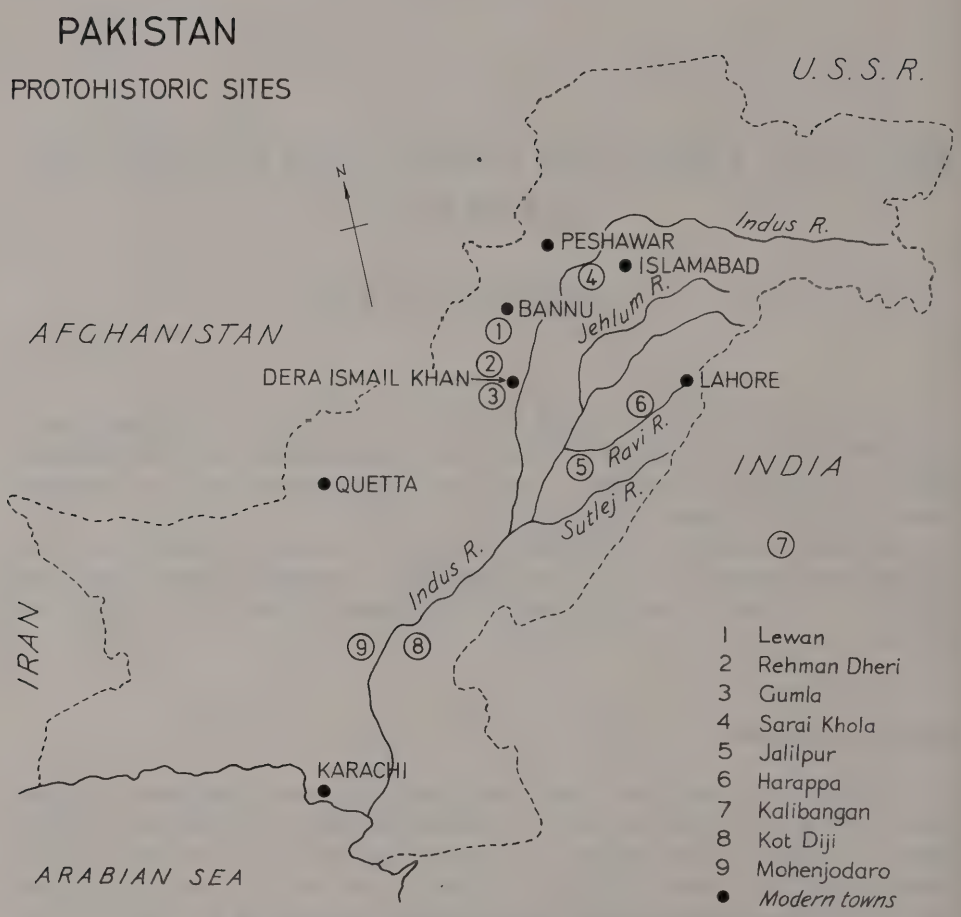


Fig. 1 Map of Pakistan showing location of the main prehistoric sites.

The mountainous area is for the most part completely barren and has no vegetation cover, but isolated stands of *Prosopis spicigera, Zizyphus mauratiana, Olea cuspidata* and *Acacia modesta* are found in the Seikh Budin and Marwat Bhittani Ranges. The piedmont plain is marked by sacchummunje on the sandy soils, *Acacia arabica, Capparis aphylla* and *Salsola foetida* on the saline soils, while *Prosopis glandulosa* and *Calotropis procera* are found on silty and clayey soils. Within the riverine tract is found a variety of tree vegetation, of which the most important are *Phoenix dactylifera, Tamarix articulata,* and *Dalbergia sissoo.*

In the absence of continuous vegetation cover the area is exposed to subaerial erosion of different types. Wind erosion takes place for nearly the whole of the year, but

becomes very severe in the dry periods before and after the summer monsoons. Torrential rainfall, which is received mainly in a few storms, encourages sheet erosion over a wide area and gully erosion along stream courses.

Physical setting and hydrology

The Gomal plain is primarily formed by the piedmont of the Suleiman Range (Ahmad, 1951: 17). It slopes gently from the Khisore and Marwat Ranges in the north-west to the south and south-east in a triangular shape towards the Indus River. In summer, the gravelly slopes of the barren hills become too hot, and the intense heat forces the population down close to the river with their livestock, so that a transhumance pattern has developed (Dichter, 1967: 161). The plain itself is extremely flat, traversed by numerous torrents; in places the relief is undulating due to sandy deposits (Said, 1972). Rainfall is low and irrigation agriculture depends solely on impounding ephemeral torrential ravine flows in *rud kuhi* systems (or on tube wells, a recent feature). The *rud kuhis* or dry torrents are impounded during floods in the rainy season in the alluvial fans and the plain below. Among a number of torrents in the area, the most important are Mir Sahib Nala to the north and Takwara Rud to the south of Rehman Dheri (see Fig. 2A). These are seasonal streams which remain dry for most of the year, but which are swollen with flood in the rainy season. The study of air photos suggests that these torrents previously contained perennial water as they were joined to the *zams* in the north-west. It is significant to note that a common feature of the *zams* is their frequent changes of course as they follow down the alluvial fans, bringing important changes in the hydrology of the streams in the lower basin.

As water is the major constraint in the choice and distribution of crops and the pattern of settlement in the area, the diversion of the *zam* channels in the past has been responsible for major changes in the distribution of crops and also in certain cases the migration of populations.

This is confirmed by the sites of abandoned settlements that are found throughout the Gomal basin. Revenue records for the last 100 years show that until very recently these were flourishing villages and hamlets, practising irrigated farming mainly with the help of water derived from the numerous branches of the *zams*. It appears that the shifting channels of the *zams* in the alluvial fan belts has resulted in the diversion of water from *zam* channels and the abandonment of settlements in the lower plains.

The Indus River is about 10 miles (16 km) towards the east, and is passing through a stage of aggradation. It has all the characteristics of a braided stream; the trunk stream is split into numerous channels separated by channel bars which frequently shift their positions. The width of the meander belt is at places more than 5 miles (8 km). There is field evidence to suggest that the Indus was flowing only about 3 miles (5 km east of the Rehman Dheri site, near Kech village in antiquity (Fig. 2B, C; observations of Dr Said, pers. comm.).

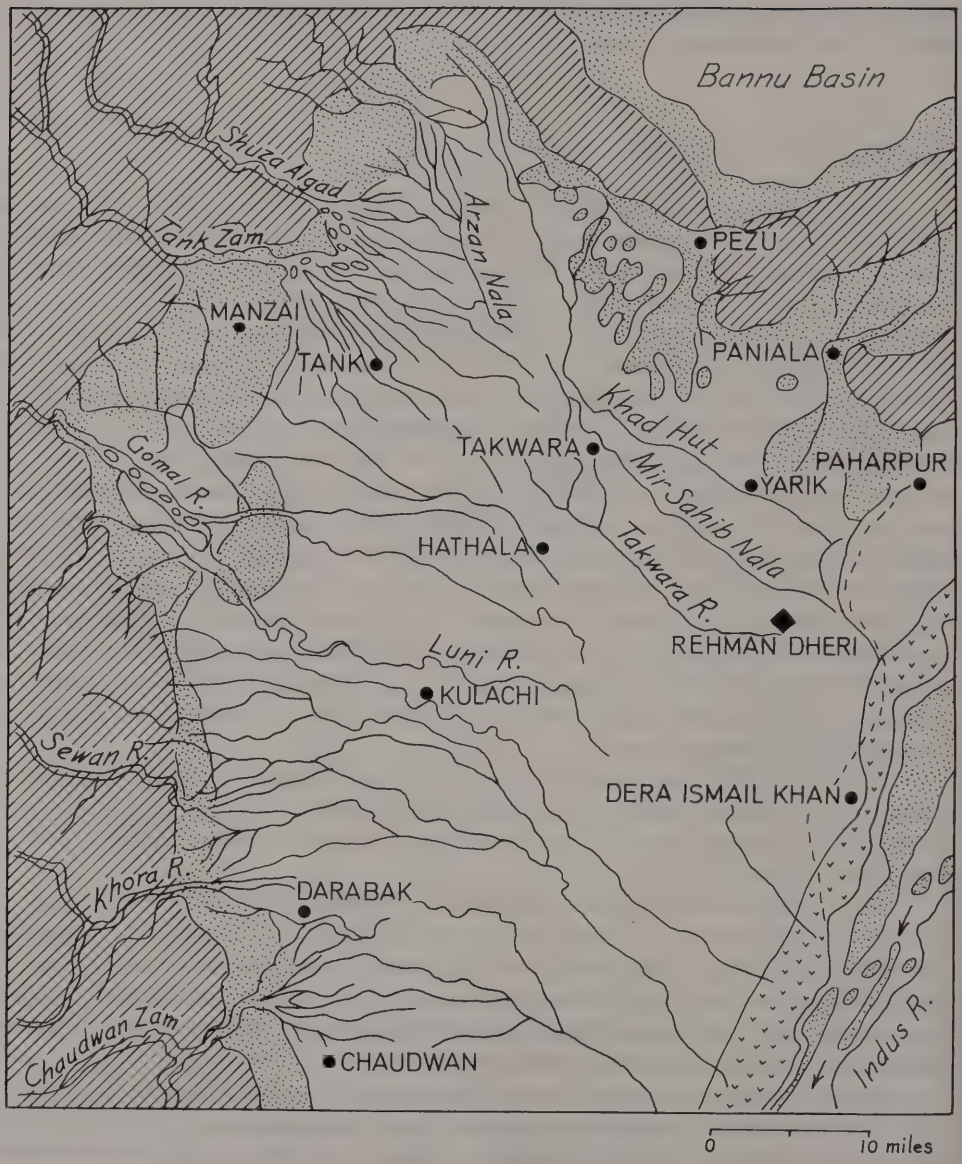


Fig. 2A Physical features of the Gomal plain with the Rud-Kohi system, and showing ancient contact between the flood plain and the Indus.

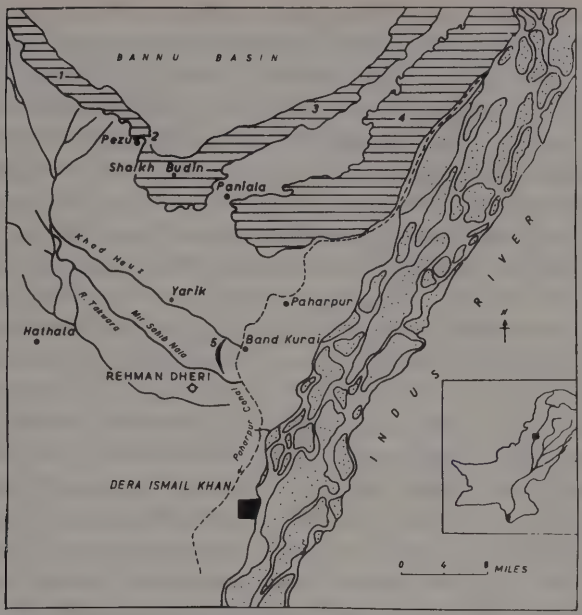


Fig. 2B The Gomal plain with the location of Rehman Dheri and the Indus. The ancient river bank is marked at 5.

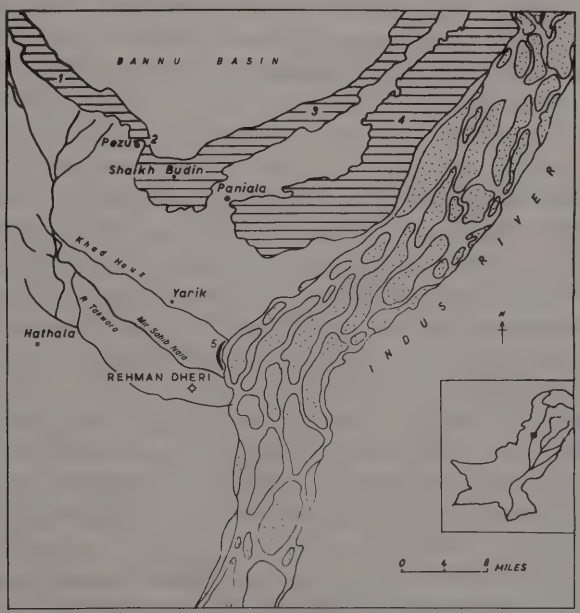


Fig. 2C The Gomal plain with Rehman Dheri and a hypothetical reconstruction of the course of the Indus at the time of the ancient bank, 5.

The ground water table varies considerably in the area. The nearer to the river, the higher is the ground water table. Around Paharpur Canal, for instance (4 miles (7 km) from the Indus), it is about 30 ft (9 m) below the surface, by Takwara Rud (now a dry torrent 8 miles (13 km) from the river) it is 70 ft (21 m) below the surface, and near the site it is 96 ft (29 m) below the surface. The quality of the water is poor, brackish and highly mineralised (200–500 ppm). With the introduction of the Chashma Right Bank Canal that will pass only 2 miles (3 km) from the site this situation might change. Although various schemes of drinking water supply are being planned, the population depends largely on rain-water collected in the ponds. Water therefore remains a critical resource variable. The current physical environments of Rehman Dheri are inhospitable for the occupation of a large settlement of the size of Rehman Dheri. There is no evidence for major change in the distribution of temperature and precipitation since the occupation of the site. However, it seems certain that the site was provided with an abundant and good water supply either derived from the *zams* through Mir Sahib and Takwara streams (now dry flood streams), or one of the channels of the Indus flowing close by, as already noted. Owing to these the ground water table would have been higher, and the environment around the site considerably more favourable. Perhaps a change in the hydrology of the site by the mature Harappan resulted in the abandonment of the site. With such a major change, only a small site, Hissam Dheri, 400 m from Rehman Dheri and a true Harappan industrial village engaged perhaps in the production of terracotta cakes, survived in the mature Harappan period. Evidence for large-scale Harappan settlement which is lacking at present may come from future explorations. For, as is attested by the burnt brick Harappan settlement at Mahra Sharif, Harappan towns in the Gomal plain must have been flourishing where the local environments was favourable.

The site

Stretching into a parallelogram or rectangle, Rehman Dheri covers an area of 1800 x 1300 ft (540 x 390 m) and rises gradually to a maximum height of about 20 ft (6 m) amidst the vast and desolate Gomal plain like 'a battleship anchored in the midst of a calm sea'. It provides the earliest known evidence of an economic and demographic concentration giving rise to a major proto-urban centre in the sub-continent. The findings from this site also indicate very clearly the significance of its role in the development of civilisation on the Indus plain.

Not too long ago the origin of the Indus civilisation was shrouded in mystery. Its 'suddenness' misled the scholars to suggest a Mesopotamian (Wheeler, 1960a: 101–4; Ghosh, 1965: 117) or Pak-Afghan borderland (Fairservis, 1971: 221; Dales, 1973: 157–70) origin for this civilisation. However, it is hard to accept these arguments since, although there can be stimulating influences from outside, civilisations can hardly be uprooted *en bloc* from one habitat and planted in another. Instead, it may be reasonable to suppose that as long as the ecological potential of an area offers suitable conditions and opportunities an indigenous growth of civilisation can certainly be ensured. Perhaps

the above-noted observations of these scholars were based on limitations of archaeological discoveries. To have proposed an alien origin for the Indus civilisation two decades ago is understandable from a lack of evidence regarding its formative stages. During the past 20 years, however, evidence from sites such as Kot-Diji (Khan, 1965), Sarai Khola (Halim, 1972), Jalilpur (Mughal, 1974), Kalibangan (Lal and Thapar, 1967), and Surkatoda (Joshi, 1972) has provided a basis for fresh discussion of the subject. The Rehman Dheri excavations carried out jointly by the Departments of Archaeology of the University of Peshawar and the Government of Pakistan under the direction of the author since 1976 have yielded crucial evidence which bears significantly on the indigenous evolution of the Harappan civilisation.

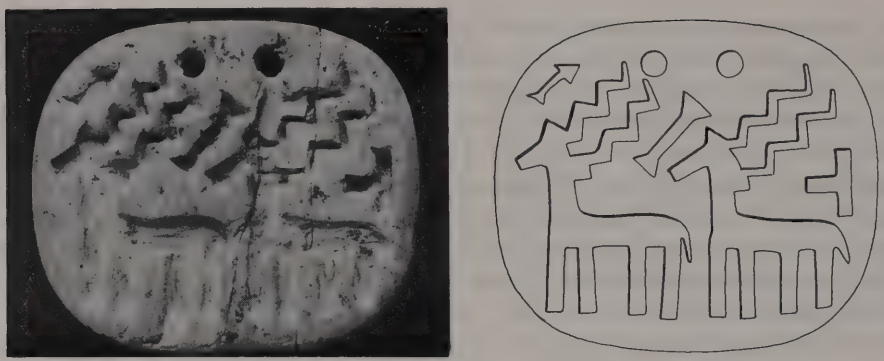
Ever since the discovery of the Kot-Dijians, they were regarded as 'fore-runners of the Harappans' (Khan, 1965). Ghosh (1965) pointed out that the origins of the Harappans may lie in the Kot-Diji–Sothi cultural matrix. Dr Rafique Mughal (1970) sythesised the material from many of these sites, the early levels of Amri, and the pre-defence levels of Harappa, and proposed the term 'early Harappan' for this cultural stage. About Kali-bangan, Lal (1979: 65) maintains 'that this pre-Harappan culture along with its cousins further to the west may have contributed in no small measure to the make-up of the Indus civilisations as a whole'.

Elements of continuity from this phase into the mature phase of the Harappan are (according to Lal, 1979: 95): the twin-mound system of town planning; the typical brick size; some shapes, forms, and motifs in ceramics besides the fabrics; objects such as terracotta cakes and carts; disc-shaped and lapis lazuli beads. Missing from the list so far have been weights and measures, seals and sealings, and writing, a qualitative difference that explains the *raison d'être* of the Indus civilisation (Lal, 1979).

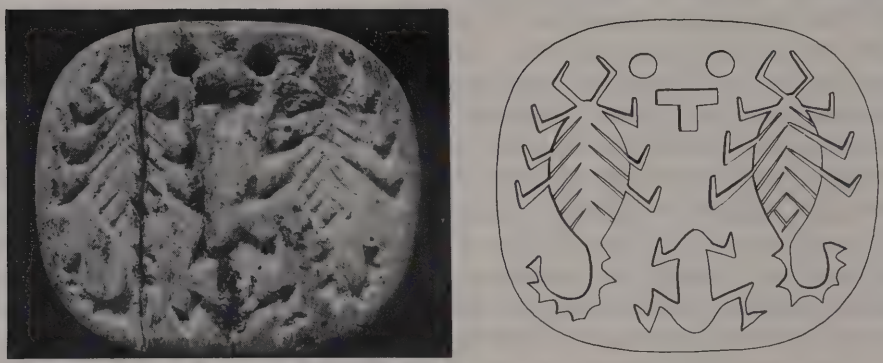
Until evidence is found to the contrary, weights and measures may still be regarded as typical contributions of the mature Harappan phase, but seals and writing can now be traced to the proto-Harappan phase, as revealed by the Rehman Dheri excavations.

From the earliest levels of Rehman Dheri for which radiocarbon dates of 4400 ± 110 bc (PRL-675) and 4520 ± 110 bc (PRL-676) have been obtained (Durrani, 1981: 138) comes an ivory seal, the first of its kind of which the author is aware in this context on the subcontinent (Plate 1A, B, and Fig. 3; size 3 × 2.7 × 0.2 cm). This biscuit-coloured seal is the most important discovery made so far. Its shape tends to be square like most of the Harappan seals. One side (Plate 1A and Fig. 3, top) shows two mountain goats in profile with the symbols T and I, while the other side (Plate 1B and Fig. 3, bottom) shows two scorpions, possibly a frog, and a T symbol. Although the animals shown on the Harappan seals are different, the symbols depicted here are among those used in Harappan writing. It may be pointed out that even if the symbols were different from those on Harappan seals, the idea of having animals along with symbols indicates an element of continuity.

As for writing, the decipherment and origin of the Indus script is still problematical. Lal recently proposed (1974: 20–4) that certain individual signs, sometimes appearing in groups of two on pottery from early Amri and some other proto-Harappan sites, may be



1(a)



1(b)

Fig. 3 and Plate I Ivory seal. Approximately × 2.

parental to Harappan writing. Gupta (1975–6: 143) doubts this, however. These marks have generally been regarded as 'potter's marks', and Rehman Dheri provides ample evidence of these so-called 'potter's marks' (Fig. 4). The evidence is still being carefully analysed, but for the present the following information on the symbols can be given. Firstly, they fall into two categories, (a) engraved, and (b) painted. While engraved symbols occur near the bases, those that are painted appear on the neck below the rim. Secondly, these symbols become more frequent in the intermediate and upper phases of Rehman Dheri, where in some cases they appear in groups.

From the beginning of the excavations it was suspected that these symbols from Rehman Dheri could have provided a basis for the development of Harappan writing (Durrani, 1977). A comparison of the symbols (Fig. 4) used in Harappan writing and those on Rehman Dheri pottery could prove to be very useful, since some of these symbols are identical or similar to each other. One of these, a composite symbol (marked

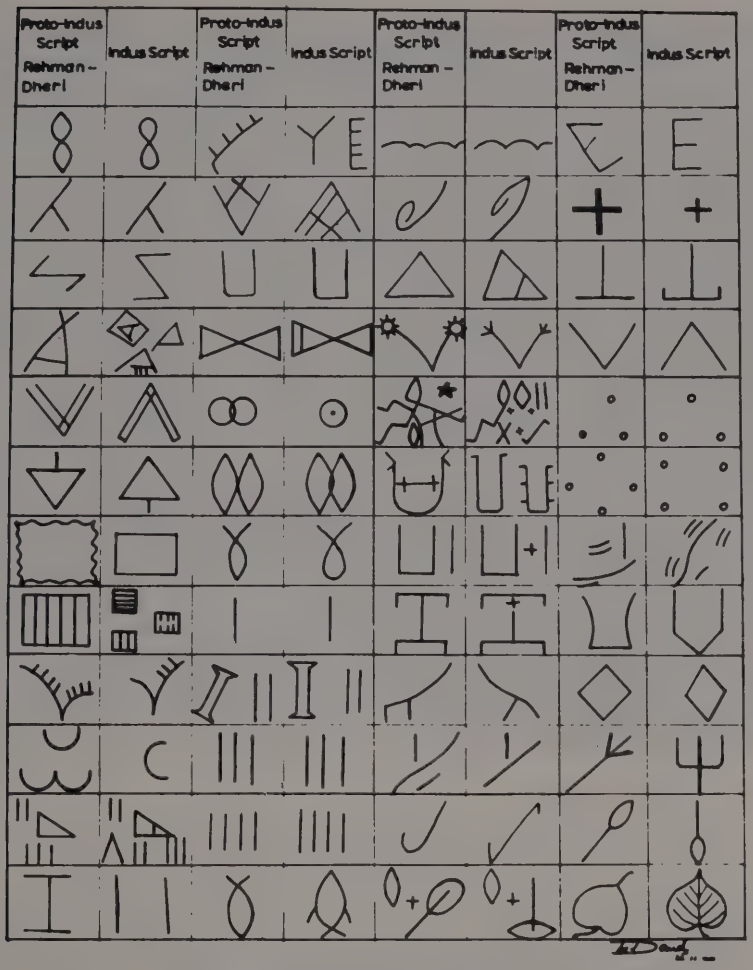


Fig. 4 Symbols used in Harappan writing.

* in Fig. 4, column 5 line 5) painted on Rehman Dheri pottery appears to be a combination of five Indus symbols. May we suggest that if the Harappans ever developed writing the process must have been initiated in the proto-Harappan phase as shown by Rehman Dheri? Perhaps more evidence and further research in the future will substantiate or modify this statement. But it may be asserted that there is reason to suggest that the so-called 'potter's mark' may have provided a basis for Harappan writing.

As for town planning, the Harappan towns have two striking features, which are the twin-mound system, and the 'grid-iron pattern'. It should be pointed out that the former has not yet been ascertained at Rehman Dheri. The aerial photograph (Plate II) of

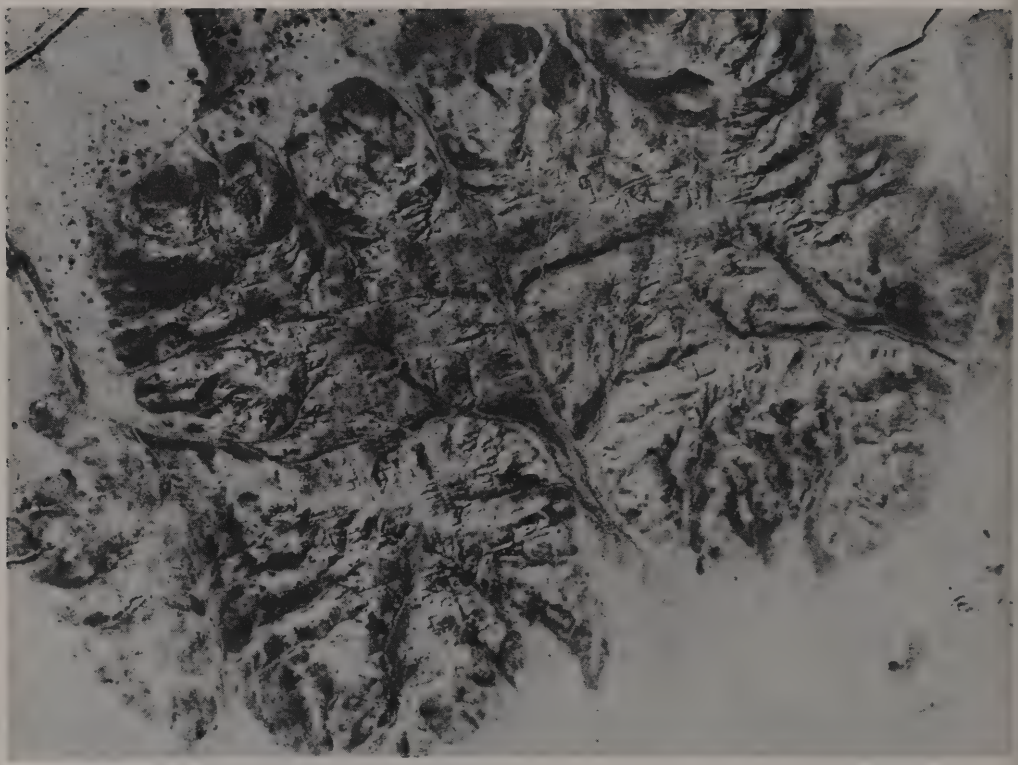


Plate II Aerial photograph of Rehman Dheri showing layout of buildings.

Rehman Dheri clearly testifies that a trend towards regimentation and a grid-iron pattern was developing here. Although it had not yet achieved the fully matured and perfect grid-iron plan of Mohenjodaro, a prototype of the same was surely on the way. The central avenue was 35 ft (11 m) wide and divided the town into two equal halves with side lanes (not as straight as those of Mohenjodaro) meeting the central avenue from either direction and dividing the entire settlement into regular blocks. The aerial photograph also indicates a possible fortification wall; this has been traced in the south-west corner of the mound to a distance of about 60ft (19 m). Gupta (1975–6) observes that while the twin-mound system passed on to the Harappan phase from the preceding Kot-Diji–Sothi complex, the street system observed at Mohenjodaro was an innovation of the mature phase. This feature seems to be in its evolutionary stages at Rehman Dheri. If ethnographic observations in the area have any bearing on archaeological interpretations, Rehman Dheri could have had a population of at least 10,000 souls, an impressive size for the fourth and early third millennium BC.

Ceramic industry

Rehman Dheri has yielded one of the richest ceramic industries on the Indus plain. Its detailed analysis is still under way, but preliminary analysis raises the following points:

(i) The lowest phase (RHD I) represents pottery of local traditions prior to the Kot-Diji–Sothi complex. Kot-Dijian elements, such as grooved ware, cylindrical vases, and flanged rim vessels do occur, but in varied and different forms. Predominant types of this phase are cups, bowls, and jars with very fine thin fabrics and elegant ring bases. They have fine painted designs drawn in black or chocolate on a red background. Most striking are those in black or chocolate outline filled with white paste; the filling seems to be fugitive or superficial and tends to fade out the moment it is exposed to the sun or touched with the hand. It is just possible that the same was applied after the firing of the pot. Besides some linear and geometric designs. this type of decoration is found in fish and animal motifs.

(ii) The linear designs from this level include those in horizontal, vertical, and oblique bands across the body with black wavy lines as those from Gumla II (Dani, 1971: Plate No. 79). Geometric designs include lozenges, stepped motifs, squares, triangles, and circles. Most of the designs may be compared to those from early Baluchi, Mundigak, Shahr-i Sokhta I and Namazga III.

(iii) The most interesting and unique decoration of this phase is the fish design, which is drawn in black or chocolate outline on red surfaces with a white filling. It mostly occurs on drinking bowls or cups of red ware. As shown in Fig. 5 the fish is depicted in a most exuberant style. In most cases the fish is shown with vertical columns and ribs in black Fig. 5, 1–3). In one case a departure from this pattern is noted (Fig. 5, 4). Here the red slip of the drinking cup is scaped off in a wavy pattern (perhaps to indicate a river), above which the fish is depicted in black outline and filled with white paste with three wavy lines which are normally accepted as a symbol for flowing water in Near Eastern mythology. Interestingly enough, all the fish seem to be floating from left to right, and although the fish is represented in profile in most cases the two eyes are shown together. Similar fish designs also occur on a dish-on-stand from Lewan in the Bannu Basin. The way in which fish are depicted on the RDH I pottery may suggest the significance of its role in early mythology. The double-eye pattern is also repeated on some of the animals and the pipal leaves drawn on the pottery (Fig. 6, 1, 11, 12). Should we assume that the double-eyed symbol also had any mythological significance? In the intermediate and upper phases (RHD II and RHD III) fish scales (Fig. 6, 8) become a characteristic design.

(iv) One on small drinking cup a horned deity drawn in black outline with white filling (Fig. 6, 9) may suggest the beginnings of this cult in the Proto-Kot-Dijian phase. On a similar cup is a mountain goat with curved horns, perhaps a markhor (Fig. 6, 7). Also represented on these cups and bowls from RHD I are bulls, scorpions, and the mountain goats mentioned above (Fig. 6, 6).

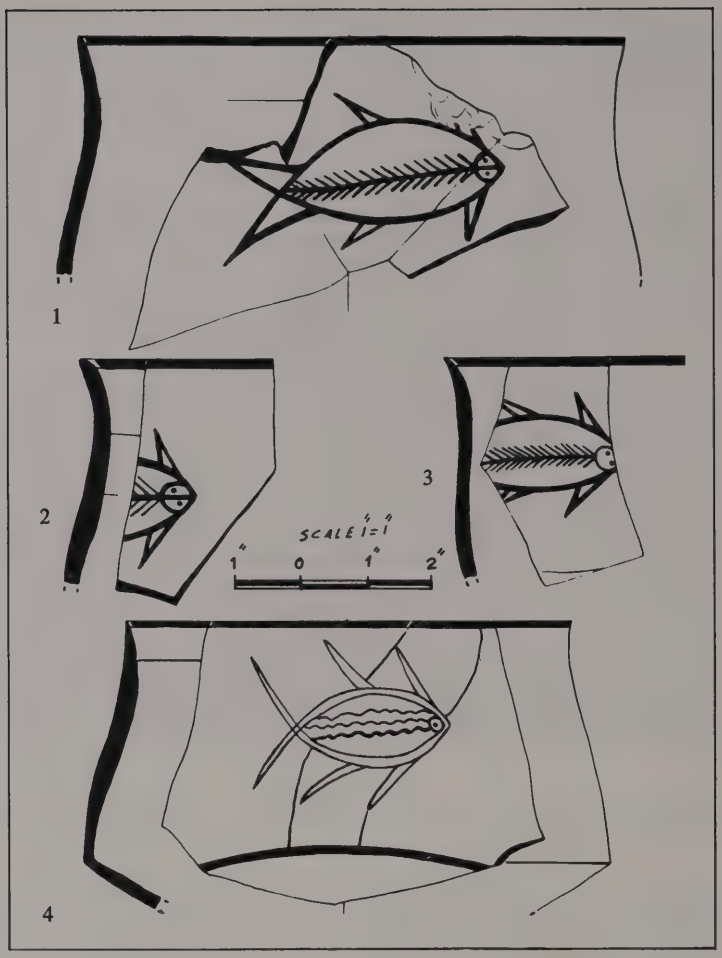


Fig. 5 Representations of fish on Rehman Dheri I pottery.

The intermediate and upper phase yielded all the characteristic pottery types and forms of the Kot-Dijian–Sothi complex, besides other vessels showing Baluchi, eastern Iranian, and Turkmenian affinities. This is understandable, since Rehman Dheri stands as a contact point between Central Asia, Iranian Baluchistan, and the Indus plain through the Gomal pass. From Rehman Dheri comes a couple of vessels in 'knobbed ware' (Fig. 6, 4, 5), and in the case of No. 5 over the Kot-Dijian grooved ware. 'Knobbed ware' vessels have been reported from the early and middle periods at Harappa (Vats, 1940: Plate LXXI, 14; 285), and from the intermediate and late levels at Mohenjodaro (Marshall,

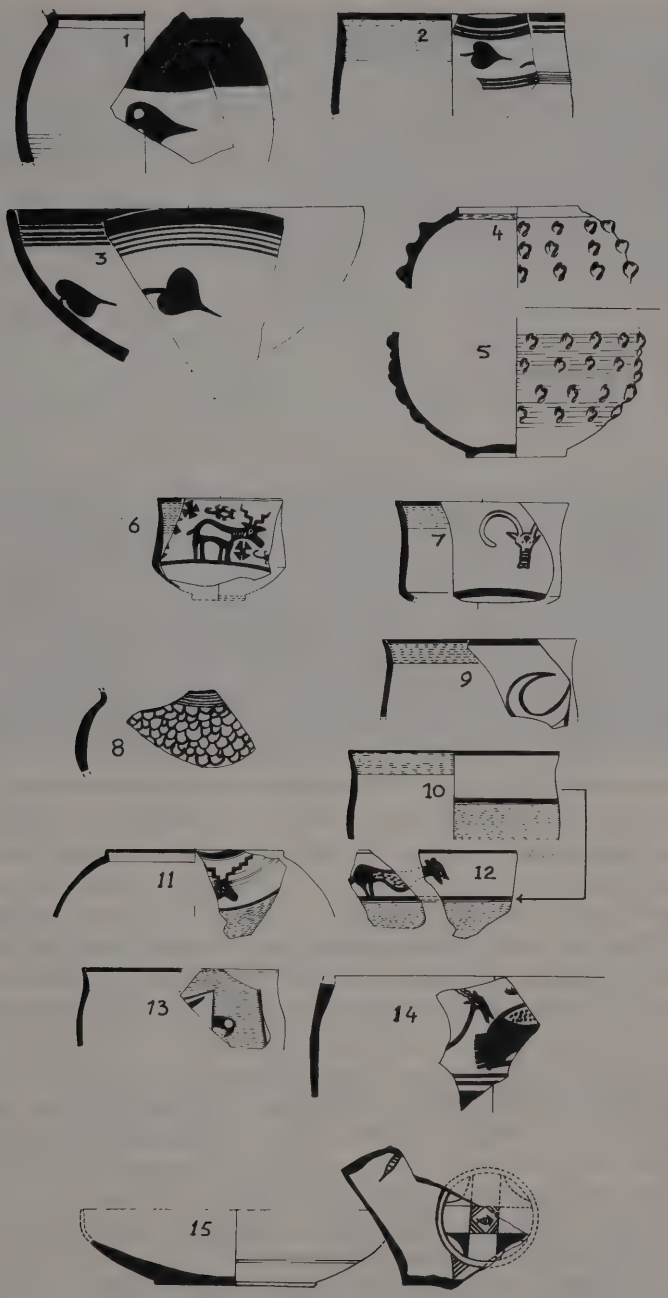


Fig. 6 Pottery of the middle and upper phases at Rehman Dheri.

1931: Plate LXXVII, 6; 315). At both places these specimens are extremely rare and are hitherto unknown from other Indus sites (Wheeler, 1960: 93). Commenting on this, Mackay remarks 'if this vase was not imported it is difficult to account for its scarcity' (1936: Plate LXVI, 54; 208). Mackay compares it to similar examples from Tell Asmar and elsewhere in south-west Asia (*ibid*.). Now we have this ware in earlier contexts found in typical Kot-Dijian types, which suggest an earlier evolution of the knobbed ware on the Indus plain. Other Harappan designs are fish scales, intersecting circles, eagles, peacocks, pipal leaves (Fig. 6, 1, 2, 13, 14) and other geometric, plant, and animal designs. Among the geometric motifs, triangles connected to squares seem to be very prominent, and have survived from the earliest phase. In one case (Fig. 6, 15), the square encloses a small fish.

A large bowl from the contemporary Lewan has a frieze showing mountain goats, buffalo, and a bull's head with pipal leaves; the horns of the mountain goats are drawn into wavy lines. All these symbols appear to have played an important role in the Indus mythology and their presence in our context may indicate the beginning of Indian iconography.

Lithic industry

Rehman Dheri has yielded a remarkable lithic industry (Farid Khan, 1979). These have been made of numerous types of stone such as flint, jasper, chalcedony, and agate. The tool kit includes lunates, which as microscopic examination has shown were obliquely hafted in (wooden) handles and used as sickle teeth; saw and leaf-shaped arrow points; spear heads, burins, various types of blades; and stone axes. Most remarkable among all these are micro-drill heads. The Italian mission found similar drills at Tepe Hissar (Bulgarelli, 1974: 24) and at Shahr-i Sokhta (Piperno, 1976: 10), and pointed out that they were used as such. A carnelian bead with the stone drill still in the half-finished perforation from Rehman Dheri (Plate III) confirms this opinion. In the upper levels from Rehman Dheri blades tend to be closer to those from Mohenjodaro, Harappa, and the other mature Indus sites.

Rehman Dheri possesses the richest bead industry of the contemporary sites on the subcontinent. The few round furnaces, lumps of lapis, carnelian, agate, and turquoise, and the availability of unfinished beads with stone drills intact would suggest that bead manufacturing was carried out at the site which certainly served as a major trade centre for the Gomal plain.

The beads show great variety of shapes and forms, including the Harappan disc-shaped. Lapis lazuli, a common material at Rehman Dheri, has never been so abundant on early Bronze Age sites on the subcontinent. Lapis lazuli, whose source is the Badakhshan region of north-eastern Afghanistan, has long been a prized commodity of the Near East; this would point to long-distance trade of the Indus valley people in the incipient or proto-urban stage. Gold beads and rings were recorded, but they occur in thin sheets or wire. It seems that gold was still a rare metal.

Other metal objects included bronze rods, chisels, nail-files, needles, axes, and compartmented stamp seals.

Plate III Carnelian bead with stone drill-bit still in position in the half-completed perforation.

Bone tools included extremely fine and well-polished spatulae, needles, and pointers. The latter were perhaps used by potters to produce grooved bands across the vases and cylindrical jars.

Thus it may be reasonable to conclude that the role of Rehman Dheri has been significant in the development of civilisation in Pakistan. For it clearly demonstrates that the Harappan civilisation evolved indigenously in the Indus valley. As noted, the evolution of a proto-urban and proto-literate society, characterised by the initiation of writing, seals and sealings, specialised crafts, long distance trade and population nucleation, and well planned settlement is fully attested at Rehman Dheri in the late fourth and early third millennia BC.

Acknowledgements

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Abstract

An account is given of the important site of Rehman Dheri, where excavations have revealed a proto-Harappan phase with very early radiocarbon dates. There are many cultural features which anticipate the mature Harappan culture, including the occurrence on an ivory seal from the earliest levels of two symbols later used in the Harappan script. The new evidence from Rehman Dheri greatly strengthens the case for the indigenous development of the Indus Valley civilisation.

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Investigations in the Chicha Valley, Peru, 1980

by F. MEDDENS

Introduction

Early June 1980 work was started in the Chicha valley, located in the southern highlands of Peru.

The Chicha-Soras river is a tributary to the Pampas river. In the later part of the Late Intermediate Period (*c.* AD 1000–1438) and during the Inca rule (*c.* AD 1438–1532) the area was occupied by the Soras Indians (Cieza de León, 1971: 258; Relaciones Geográficas de Indias, 1881–97: 169–77).

Some of the settlements marked on the map (Fig. 1) represent Soras sites which still exist at present. These villages were mostly established by the Spanish Viceroy Don Francisco de Toledo between 1571 and 1586 (Varallanos, 1979: 39). Most of these villages were named after the sites the Soras Indians had abandoned on order of the Spanish colonisers and Church. The destruction of the sites was ordered because the Spaniards considered the original Soras settlements to be the abodes of infidels and idol worshippers (Varallanos, 1979: 39). At least some of the 'new' colonial settlements were built near the original pre-Columbian ones.

The Incas conquered the Soras area during the reign of Pachacuti Inca Yupanqui (AD 1438–1471), a little after his battle with the Chancas (Rowe, 1963: 206).

The original purpose of the investigation was an area study, of the changing settlement patterns in the valley in the past. Special attention would be paid to the Middle Horizon occupation as indicated by the pre-historic remains in the area.

The Middle Horizon covers a period from approximately AD 550 to 1000, during which the Huari ceramic style becomes very influential, if not dominant over most of the Peruvian culture area. The developments of the first half of the Middle Horizon have been interpreted as the expansion and fall of a Huari empire. The nature of the archaeological evidence for this period is however such that the hypothesis remains unverified and the existence of an empire disputable.

After AD 800 an increased regionalisation of the Peruvian art styles appears to occur. The impact made by the Huari culture was long lasting. Until approximately AD 1000 its influence can still be detected in the individual Peruvian ceramic styles (Menzel, 1964: 1–105). During the following Late Intermediate Period (*c.* AD 1000–1438) the

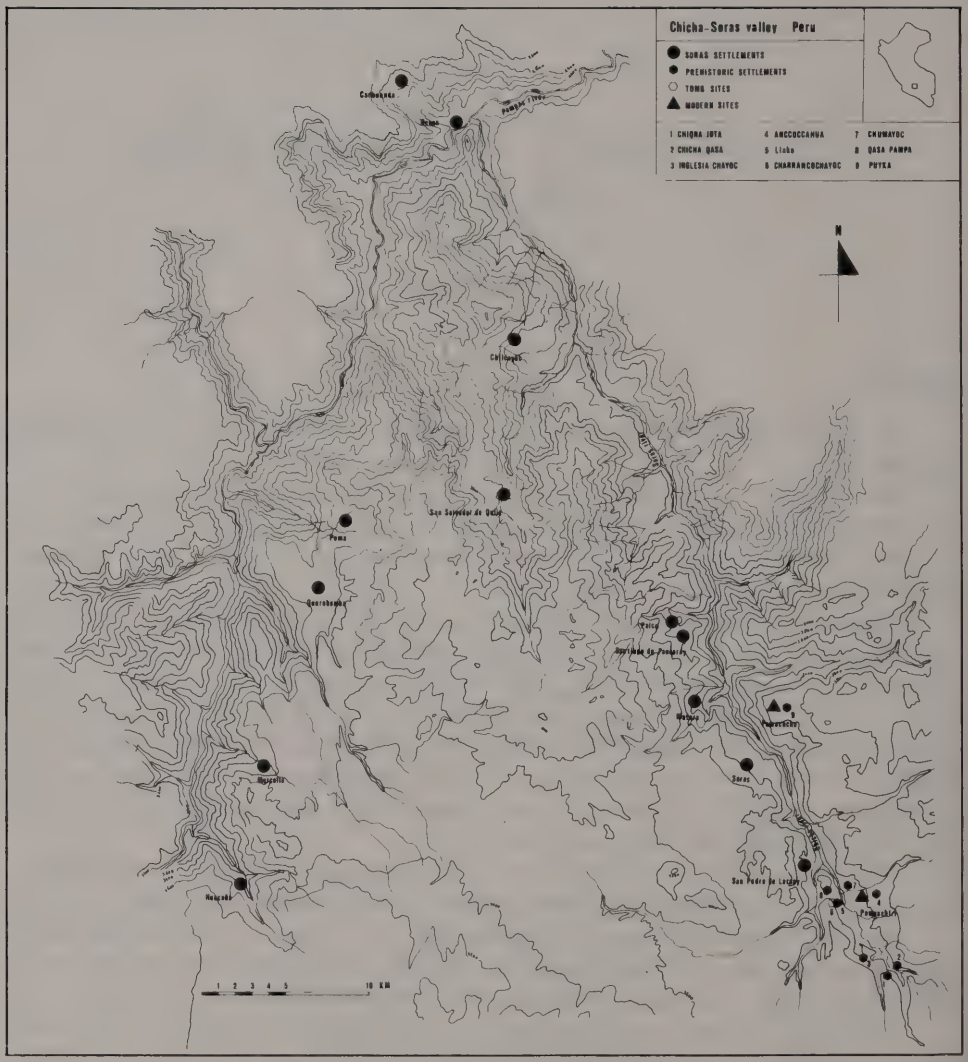


Fig. 1 The Soras area, with Chicha-Soras river valley.

regionalisation of Peruvian cultures becomes complete. In certain areas, for example the Ica valley, there are during this period revivals of Huari stylistic patterns (Menzel, 1977: 57–8).

This underlines the importance of Huari in Peruvian pre-history and the profound effect it had on Peruvian cultural development.

To collect the necessary data the idea was that excavation and survey should be combined. The excavations together with stylistic seriation and absolute dating techniques,

would produce a chronological sequence of the local artefact complexes. In conjunction with surface collections and mapping of pre-historic sites this would result in a complete study of the ancient settlements.

In the field these aims had to be adjusted because not all the labour counted on was available. This meant that of the three full-time survey teams which had been planned, only one full-time and one part-time group were active. Most of their effort went into the sites which were being excavated. In addition some of the excavations turned out to be far more demanding of time and labour than anticipated. This was due to the nature of the deposits and the quantity of artefacts found, which needed to be dug up with special care.

Excavations and Survey

The first excavations were carried out at Chicha Qasa (Ap2–7) (Fig. 2). The 1978 survey and mapping work done at this site had shown that it had been occupied over a number of periods. The site has up to 60 fieldstone structures, and the main occupation seems to have been located on the top of the hill in the southern part of the settlement. The houses are mostly round or oval; a few are rectangular. Erosion, caused by a bridlepath passing through the site, has exposed a series of stratified deposits.

The first excavation unit measured 2 x 4 m and was positioned on a terrace on the side of the path (Fig. 2). In the first 75 cm there was very little visible stratification, and therefore these deposits were excavated in arbitrary levels. The majority of the finds came from the upper levels, and consist of relatively small fragments of pottery and lithics. The material is mixed; continued cultivation for a long period of time would account for the lack of stratigraphy and the state of mixing of the artefacts. Three features sunk into the sterile tuff, which was reached at a depth of approximately 1.40 m, might represent post-holes. One of these contained a packing stone, another had two undecorated body sherds in its fill.

Unit II was cut into the side of the bridlepath, where the stratification looked most promising. The size of this excavation was limited by the presence of a pre-historic structure with standing walls on one side, and a mound of very large boulders on the other. The strata did not continue all the way across the path, where, in the opposing section, sterile deposits could be observed. This unit measured just 1 m^2, the top layer was probably part of the levelling done prior to the construction of the house and adjoining terrace. Below this followed a series of very hard deposits of consolidated vulcanic ash, in which all the finds were lying flat. These layers appeared to form a lens which was thicker near the side of the path than near the back section (Fig. 3). Quite a large proportion of the finds from this tuff is worn and eroded. It may be that the gully originally served as a seasonal overflow for the irrigation canal going through the site. This would explain the consolidation of the vulcanic ash, by its regular wetting and drying out, and the large quantity of eroded ceramics caused by the water. Later use of this gully as a path has eroded part of the deposits thus exposing the section. The next layers were of a softer

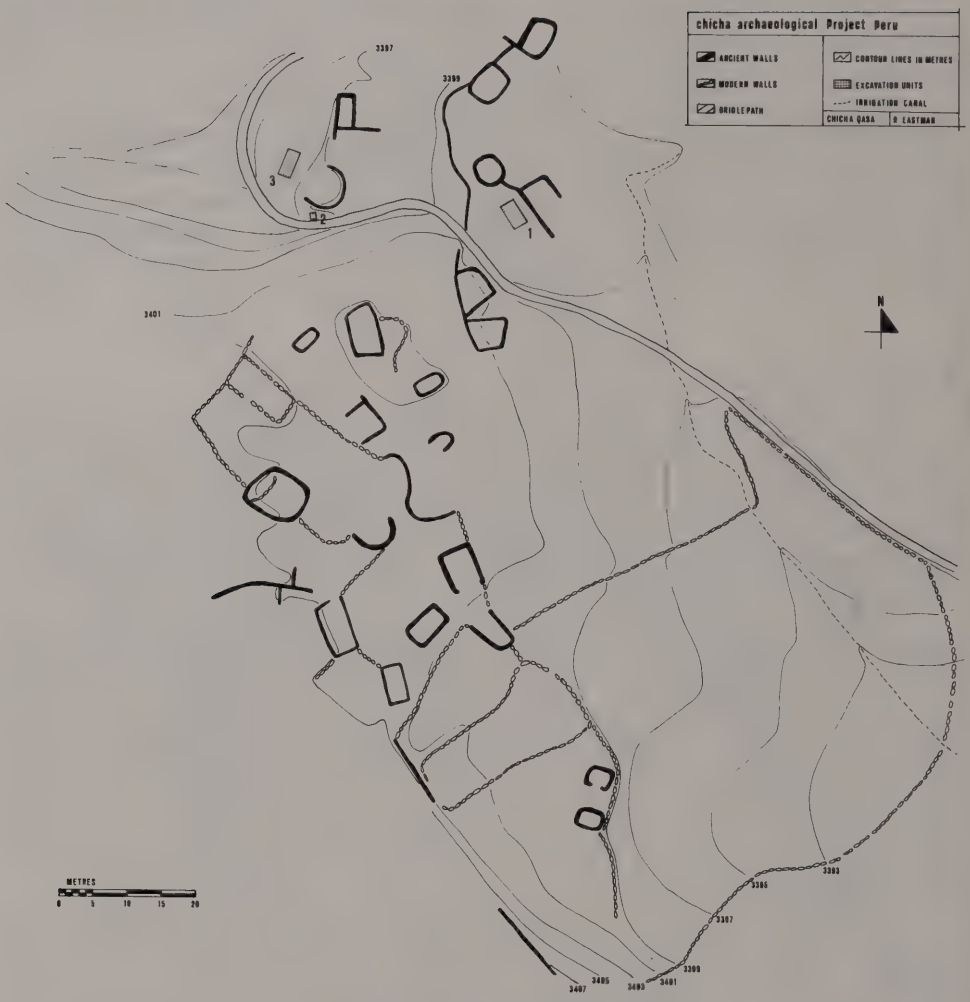
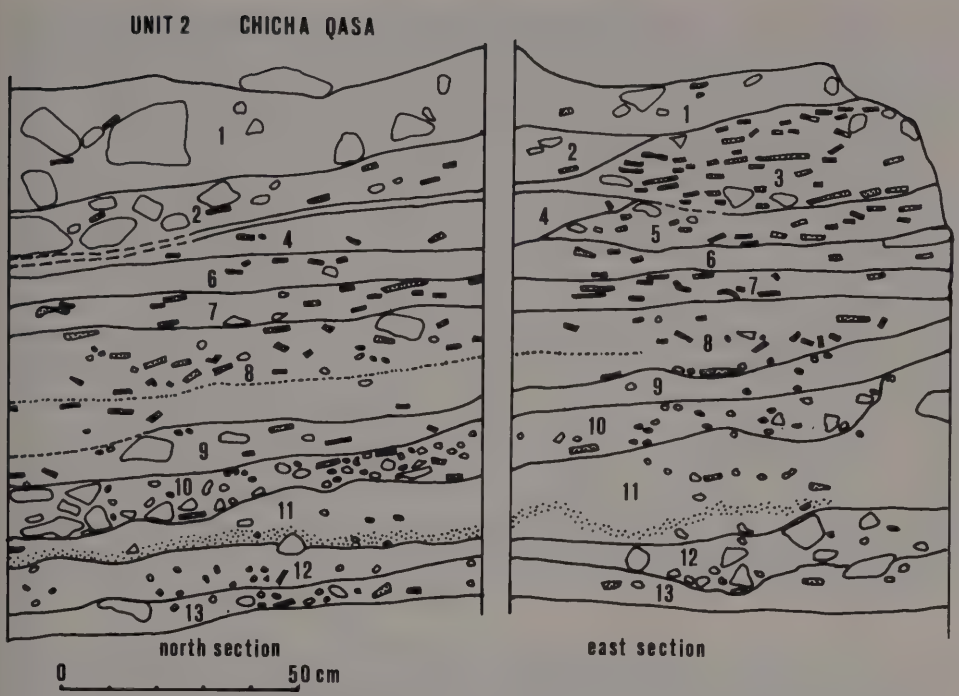


Fig. 2 Partial map of Chicha Qasa, with excavation units.

consistency and nature, and were therefore deposited by a different agency. At a depth of 1.30 m it was decided not to dig any deeper, as the wall of the structure standing on the edge of the unit presented a danger to the diggers. From the preliminary analysis of the cultural material from this unit it appears that, working from the deepest deposits upwards, there is a gradual change from Middle Horizon to Late Intermediate and finally Inca type artefacts. It appears as though the cultural material can be classified into distinct time units.



1) Loose brown soil with medium to large size stones. 2) Humic soft brown earth. 3) Very hard consolidated vulcanic ash. 4) Consolidated vulcanic ash of softer consistency than 3. 5) Brown earth with very few finds. 6) Crumbly grey brown deposit. 7) Grey vulcanic ash deposit mixed with small stones. 8) Brown grey deposit mixed with small stones. 9) Crumbly brown grey deposit. 10) Very stoney grey layer. 11) Hard yellow brown clayey layer. 12) Brown grey stoney deposit. 13) Hard brown grey deposit

pottery fragments

stones

roots

interfacial lines

projected interfacial lines

peagrit

Fig. 3 The north and east sections of excavation unit II at Chicha Qasa.

As unit II was so small, a larger one of 2 x 4 m was opened up in the terrace just below (Fig. 2), in the hope of finding similar deposits there. The sterile tuff was found at only 30 cm from the surface, the cultural material was not stratified and presented a mix. This terrace was probably constructed to serve the buildings bordering it.

The excavations carried out so far had proved rather disappointing. Other parts of the sites were unlikely to be more productive, as erosion caused by agricultural activities was likely to have affected the cultural strata. Furthermore the plan was to excavate at more than one site. Therefore this moment was chosen to move to Chiqna Jota (Lu5), across the valley (Figs. 1, 4). Approximately 200 structures remain visible on its surface

Fig. 4 Partial map of Chiqna Jota, with excavation units.

(Pl. I). A series of raised pathways criss-crosses the site and may have originally divided it into a number of functional complexes. Much more work is necessary to find out if a pattern exists, and if so, to define distinct units and their use and purpose.

The surface material indicates a mostly Middle Horizon occupation, and possibly some Late Intermediate. An interesting feature in this context is that almost all structures here have a round or oval groundplan, and no typical Middle Horizon enclosures were found (Isbell, 1977: 46–51).

Our first excavation unit here was located on top of a mound, around 12 m in diameter. Four robbed tombs were present on its perimeter. The excavation measured 3 x 4 m. The first 30–40 cm were packed with ceramics, amongst these were some very large pieces of pottery, some deformed, some partially reconstructable and some complete pots. Particularly frequent vessel shapes include a small in-curving bowl with a modelled animal head, and a variety of face neck jars (Pl. II). These deposits cover one or possibly two dumping phases; an interesting fact is that they contain very little bone. In the south-west quadrant of the excavation appeared a wall with an angular bonded corner, the fill excavated on the inside of this structure indicates that it pre-dates the dumping levels. However, only a small portion of the interior deposits was removed. In the next field season a complete excavation of this structure is planned. The fact that the part of the wall exposed has an angular bonded corner is important. This type of construction is

Pl. I General view of the northern section of Chiqna Jota, the two large buildings in the foreground measure 15 m across.

Pl. II Incurving bowl with modelled animal head.

rare at Chiqna Jota and at the other sites in the Chicha-Soras valley looked at so far. In the south-east quadrant of the same unit there was a large rock. Around it, in deposits underlying those packed with ceramics, a series of whole pots was found. Associated with these were large quantities of carbon, some carbonised textile fragments and large obsidian flakes and tools. Some very large aryballus-like carrying vessels had two to three smaller pots (open bowls with both flat and rounded bases) inside them (Fig. 5) (Pl. III). Only one of these large vessels was decorated; on its globular neck it has two vertical chevron band designs. The diagnostic designs associated with this pottery place it firmly within the Middle Horizon (Fig. 6).

In the Inca religion and mythology large stones were often regarded as 'huacas' or holy places. Sometimes the stone was conceived of as a 'god' turned to stone, after having told his people to honour his 'huaca' (Cobo, 1979: 104, 183). Often items of value, like textiles, were burned as an offering (Cobo, 1979: 169). The burial of vessels containing a variety of goods around or near a holy place is of a long-standing tradition and is practised up to today. It is therefore well documented that the type of feature found in unit I at Chiqna Jota was associated with religious ritual, and can be interpreted as an offering. Interestingly the 'usual' offerings of the first half of the Middle Horizon, as at Pacheco and Conchopata show a very different pattern (Menzel, 1964: 19–28). Here large quantities of special ceremonial ware had been ritually broken.

CHIQNA JOTA, UNIT 1, OFFERING LEVEL
rubble
stone
wall remanents
0
60 cm
Aryballus like carrying vessel: 1 2 3 4 7 11 18
Flat based open bowl: 5 6 10 13
Round based open bowl: 9 12 17
Face neck jar: 15
Short neck jar: 16
Incurving bowl: 8

Fig. 5 The offering level in unit I at Chiqna Jota.

Pl. III Aryballus-like carrying vessels during excavation.

It is necessary to date the pottery from the Chiqna Jota offering more closely, to analyse the associated carbon and to compare the material and its deposition to other Peruvian offerings.

Unit II at Chiqna Jota consists of a feature visible above ground: a wall built into the side of a terrace with a facing wall and roof supports (Pl. IV). Indeed, in one part the roof is still in place, though cracked. Three metres of the length of this 'gallery' were excavated, a cut was also made through the outside wall and part of the exterior was exposed. The most interesting find was a series of undecorated miniature pots which were found in levels just above the original floor on the inside of the 'gallery'. It was intriguing that a number of similar pots were recovered from the outside of the feature, at approximately the same level as they were found on the inside. They came from just under the remnants of the collapsed wall.

The diagnostic material associated with this find dates to the late Middle Horizon, or possibly the early phases of the Late Intermediate Period (Fig. 7). Three of the miniature pots however have shapes very much like some Inca shapes, for instance the 'Manca' (Pl. V) Kauffmann Doig, 1978: 727). It is hoped that thermoluminescence dating of some of this Inca-like material will clarify if it is a later intrusion into the deposits where it was found, or if it in fact forms an antecedent to later Inca pottery.

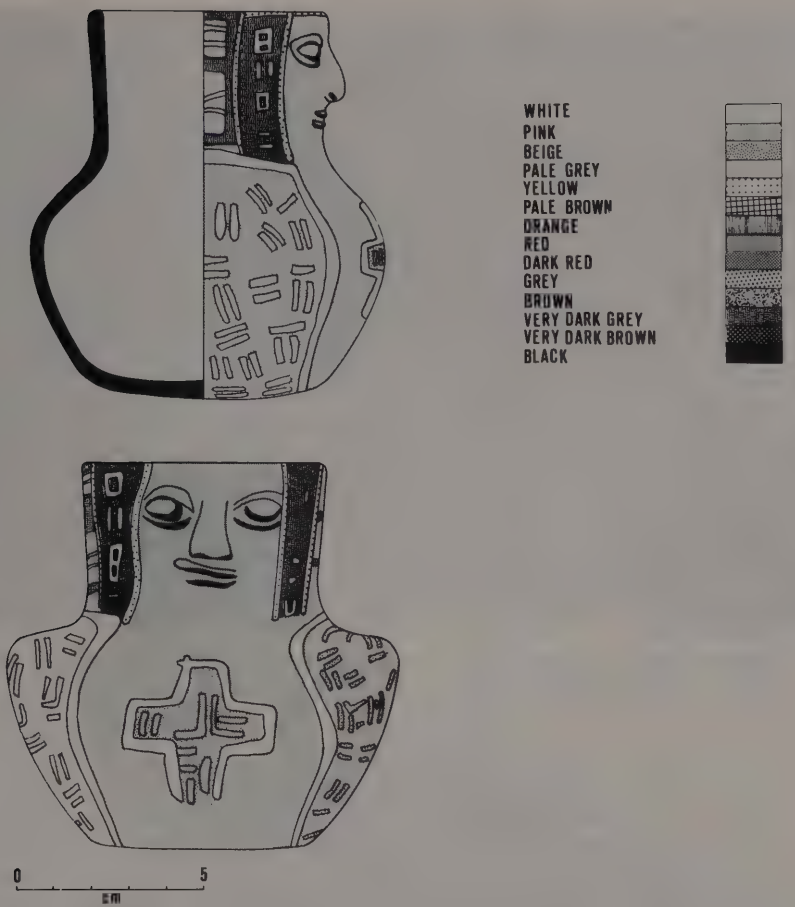


Fig. 6 Small face neck jar from offering deposit.

From the work done so far on this 'gallery' its use has not become clear yet. It does not seem to have had any doorways. From other galleries known in Peruvian prehistory, and the interpretation given to these, some ceremonial use seems to be indicated (Isbell, 1977: 38–41), the nature of which remains obscure.

Some of the largest structures on the site are located near unit II. For instance, a unique building, not just for this site but for the area, is situated less than 10 m to the north. It has angular corners, niches, and a possible buttress. There are some construction features visible in what is left standing of this building which do not make much sense structurally. These aspects, combined with the fact that the offering was also found within this area, may indicate that this was the ceremonial precinct of the site. This remains an hypothesis which needs more testing.

Pl. IV Gallery under excavation; note the roof construction and the collapsed lintel in the back section.

A cut was made through two terraces just below unit I. The top terrace had very little soil, 10–15 cm, which was followed by a thick layer, up to 40 cm, of stones, ceramics, lithics and bone. As a result of this method of construction, the topsoil must have been extremely dry. One possible use of this terrace could have been to dry maize prior to making the native maize beer, chicha. Nowadays maize is dried on plastic sheets in the sun. If this terrace was constructed for cultivation, however, it could have only supported a crop which required extremely arid conditions. Our floatation samples from this unit could give some better idea about the function of the terrace.

The next terrace immediately downslope was totally different, in that it had a relatively deep soil cover (approximately 60 cm). Its only noteworthy feature was a number of large boulders on top of the sterile tuff which underlay the cultural deposits. It is quite possible that these boulders were already present prior to the construction of the terrace and therefore represent but a natural geological feature.

Dr H. Keeley made two more cuts in other terraces in order to study their soils. These terraces again were different from any of the others excavated. Both had extremely deep soils, around 2 m, associated with them. Samples (soil and floatation) taken from these and the other terraces at Chiqna Jota are still to be analysed. The cultural material associated with them appears to date to the Middle Horizon.

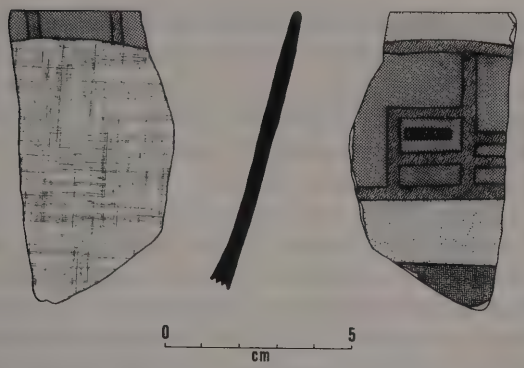


Fig. 7 Cup fragment associated with miniature pots.

A small 1 m^2 cut was made in one of the raised pathways. Retaining walls were still *in situ* on either side of the path along sections of it. The excavation exposed a path surface of tamped earth and a drainage layer of rubble. Below the rubble a wall diagonally crossed the excavation. Unfortunately there was no time to extend this unit to find out what this wall related to.

Pl. V Small undecorated pot with a shape very much like the Inca 'manca'.

The majority of the bones recovered from the excavations at Chiqna Jota and Chicha Qasa were camelid, with a few deer bones, one guinea-pig jaw, and two bones which are probably domestic dog.

There was a clear difference in the lithic collections excavated at both sites. The lithics recovered from Chicha Qasa included far more waste material than was found at Chiqna Jota, where the majority consisted of tools.

At Anccoccahua, just behind our basecamp in Pampachiri (Fig. 1), one surface collection unit was completed. The material collected seems to date the site to somewhere in the Late Intermediate Period. Virtually no structural evidence remains on the surface. There are some terrace retaining walls and a few rubble concentrations might indicate round houses. This site is situated on top of a hill in the east side of which a number of robbed tombs were found. Here, from a crevasse under a large rock a large vessel was dug up. It had been made on a fast wheel, and its constricted neck contained the remnants of some sort of plug. This pot dates to the colonial period, as the fast wheel was not known in pre-historic Peru. It is not unlikely that this feature represents a colonial offering, since the tradition of making offerings to the gods continues to this day (Mishkin, 1963: 462–5; Flores-Ochoa, 1979: 76–8).

Surface collections were also made at Imglesia Chayoc and Puyka. Imglesia Chayoc is very large and the structural remains are widely spaced. It is interesting that surface material is sparse and consists mostly of lithics. The few pottery fragments indicate a Middle Horizon date. One of the structures is of special interest. Its dimensions are approximately 3 x 20 m, it has gables at either end, in each of which a round 'window' is present. The corners are angular and bonded, and they are additionally reinforced by wooden stakes lying flat and placed diagonally through them. The two entrances into this building are in the north wall, which is one of the long sides of this rectangular structure. It should be possible to get C-14 dates from the wood used in its construction. These dates should then be used with caution as wood is a scarce commodity in the area and it may well have been re-used from earlier buildings.

Puyka is a small site with no more than 30 relatively small round buildings. Its surface material dates to the Late Intermediate Period, and it is located on the top of a hill near Pomacocha (Fig. 1).

Future work will concentrate on Chiqna Jota, where the site and its importance in the area are to be assessed. Furthermore its development, internal organisation and the importance of its ceremonial aspects are to be looked at in more detail. The Chicha Archaeological Project is currently engaged in raising funds for a 1982 field season.

Acknowledgements

The fieldwork and research upon which this report is based would not have been possible without the help and co-operation of a great many people. In particular I would like to thank Aeroperu, Gist-Brocades NV, Meddens & Partners BV, Nijs & Vale BV, Radio

Holland BV, Volker Stevnin group NV, Tema BV, The Albert Reckitt Charitable Trust, the Central Research Fund of London University, the Gordon Childe and Margary bequest funds and the Royal Geographical Society. I would also like to thank everybody who worked in the field and those numerous individuals and institutions who supported us in a variety of ways and who I intend to acknowledge in more detail elsewhere.

Abstract

This article presents a preliminary assessment of the investigations of the Chicha Archaeological Project in the Chicha-Soras valley, Peru. A brief outline of the ethnohistorical background, the Middle Horizon in Peruvian pre-history and the research programme is given. This is followed by a discussion of the excavations carried out at Chicha Qasa and Chiqna Jota, the results of which are interpreted in the light of previous archaeological work and ethnohistorical data. The survey work done at other sites in the valley is described and priorities for future work in the Chicha-Soras valley are given.

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A Soil Handbook for Archaeologists

by HELEN C. M. KEELEY and RICHARD I. MACPHAIL

Introduction

Soils are complex natural bodies evolving in response to the interaction of environmental factors, particularly climate, organisms (including man), parent material, relief, and the passage of time. There have been five important trends in soil development during the post-glacial period in the British Isles: podzolisation, clay eluviation, gleying, erosion and peat formation, and it is clear that man has considerably influenced these.

Archaeological excavations may provide the opportunity to study soils which have been sealed. The buried soil itself gives evidence of the stage of soil development reached at the time of burial and comparison with modern soil profiles can indicate subsequent pedogenesis. Evidence of the past landscape derived from pedological studies is considerably strengthened when linked with pollen or molluscan analysis, examination of macroscopic plant remains and other aspects of environmental archaeology.

During excavation many archaeologists encounter pedological and sedimentological phenomena which causes problems in stratigraphic interpretation of the site. In this paper we are attempting to isolate and explain such phenomena and to present excavators with a guide to recognising and solving some of these problems themselves.

There is a vast literature on soils but most books are written from the agricultural, geographical or purely pedological point of view. However for general reading *World Soils* by E. M. Bridges (Cambridge University Press, second edition, 1978) can be recommended. *Soils for the Archaeologist* by I. W. Cornwall (Pheonix, 1958) and *Soil Science and Archaeology* by S. Limbrey (Academic Press, 1975) are two of the few books which examine soils from an archaeological standpoint, although the former is rather out of date. Excavators are also urged to obtain the modestly priced *Soil Survey Field Handbook* by J. M. Hodgson (Soil Survey Technical Monograph No. 5 1976).

Prior to excavation it is recommended that the archaeologist consults the geology and soil maps of the locality. A knowledge of local parent material will give some idea as to the nature of the soils, and a Soil Survey map may reveal the soil series most likely to be found on the site. These maps, and accompanying texts, are available from the Soil Surveys of England and Wales and Scotland (prices vary from approximately £1 to £10 but are generally at the lower end of this range). Full soil map coverage is not yet available but, in the absence of a map, the excavator may find it useful to contact the local Soil Survey office for information. A list of offices and Soil Survey publications

may be obtained from their headquarters (Soil Survey of England and Wales, Rothamsted Experimental Station, Harpenden, Herts; The Soil Survey of Scotland, Macauley Research Institute, Craigiebuckler, Aberdeen).

At the beginning of an excavation soil profile pits should be dug adjacent to the site, in order to examine the 'natural' soil profile, and this may eliminate many on-site interpretive problems.

Soil Description

Soil scientists use, as far as possible, a standard method of describing soils so that their work can be usefully compared with that of others and the terms involved are assumed to be consistent. In England and Wales the soil classification system described in the *Soil Survey Field Handbook* (Hodgson, 1976) is in general use. Often archaeologists tend to use a personal system of describing soils, sediments and archaeological deposits and consequently inter-site comparisons are virtually impossible. One of our aims here, therefore, is to introduce a simple, standard soil description system, for use by excavators, which is based on, and should be used in conjuction with, the *Soil Survey Field Handbook*.

The excavator may find it useful to use a context recording card similar to that shown in Fig. 1. The description should include:

(a) Matrix colour
(b) Matrix texture
(c) Matrix consistence
(d) Coarse components

The matrix consists of material of sand grade or finer, i.e. less than 2.00 mm diameter; the coarse components are gravels and stones.

(a) *Matrix colour*

Colours should be measured at standard moistness using a Munsell colour chart. These can be obtained from Tintometer Limited, Waterloo Road, Salisbury, and cost around £40. If the deposits are dry they should be moistened by using a fine spray of water; soil colours in the dry state may be given in addition, if required.

(b) *Matrix texture*

This refers to the relative proportions of sand, silt and clay in the soil and can be described using the terms outlined in the *Soil Survey Field Handbook*. However a simplified version may be more appropriate for use in archaeology, particularly for those inexperienced in soil description.

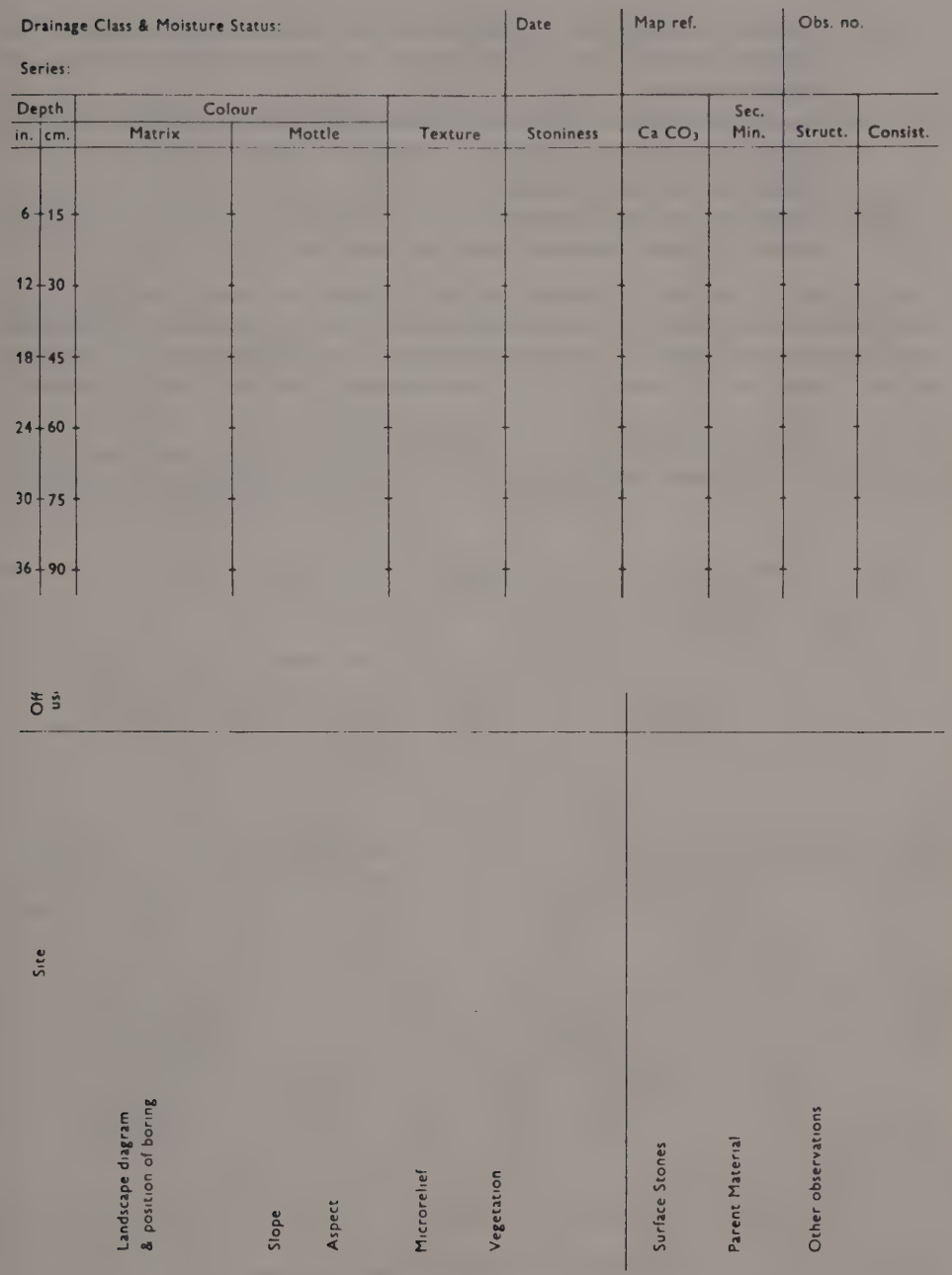

Fig. 1 An example of a context recording card.

Sand: Mineral particles 0.06–2.00 mm in diameter; these particles are visible to the naked eye and feel gritty when the soil is moistened and rubbed between finger and thumb.

Silt: Mineral particles 0.002–0.06 mm in diameter; the particles cannot be detected with the naked eye but soils with a large silt fraction have a 'soapy' or 'silky' feel and are only slightly sticky.

Clay: Mineral matter less than 0.002 mm in diameter; clay causes soils to cohere strongly and gives a sticky or plastic feel when wet.

Loam is a term often used by archaeologists and, although no longer in use in the Soil Survey classification system, it is useful to include it here. In agricultural terminology loam is a mixture of sand, silt, clay and humus (organic matter) which gives an optimum tilth and fertility for cultivation. Its use as a textural term in soil description is illustrated in Fig. 2.

The following textural categories are used by the Soil Survey of England and Wales (as shown in Fig. 3), some of which are subtle and require a considerable amount of

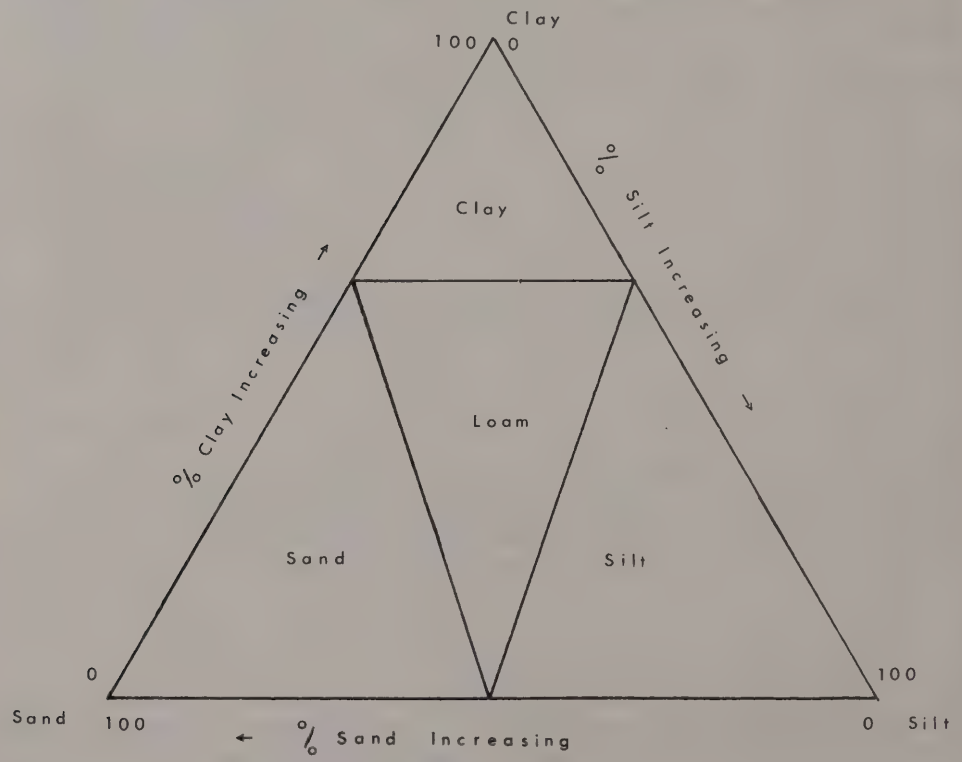

Fig. 2 A simple arrangement of particle-size classes.

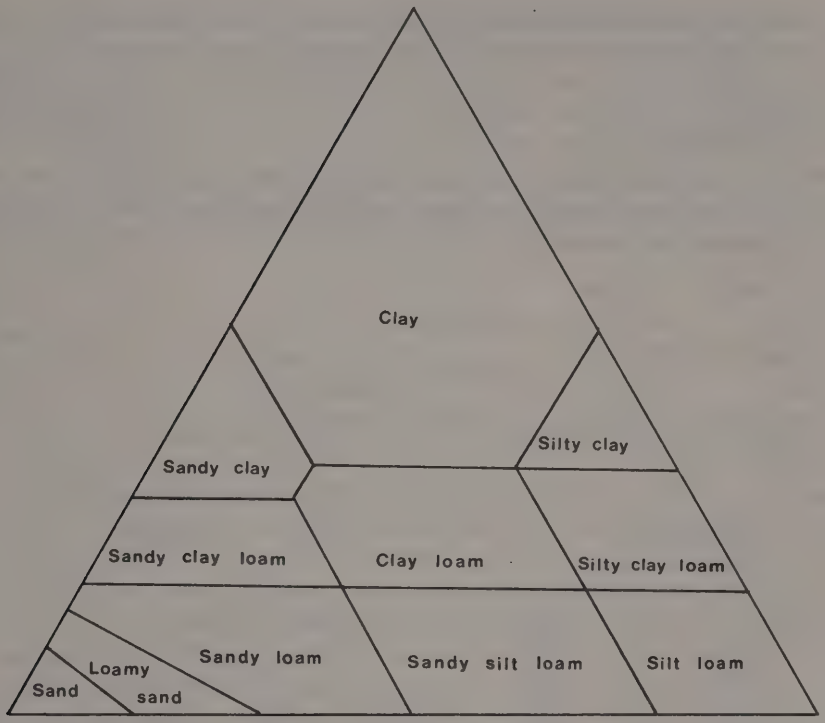

Fig. 3 Particle-size classes.

experience to diagnose with accuracy. However the four-component system described previously is probably too simple and may be strengthened by using the terms which have been underlined:

1. Sand
2. Loamy sand
3. Sandy loam
4. Sandy clay loam
5. Sandy clay
6. Clay
7. Silty clay
8. Silty clay loam
9. Silty loam
10. Sandy silt loam
11. Clay loam

(c) *Matrix consistence*

This refers to the handling properties of the soil together with its cohesion, adhesion, strength and cementation. The following terms are suggested: Loose, Weak,

Firm, Strong, Rigid, Cemented, Sticky, Plastic – plasticity refers to the degree to which a moist soil can be rolled into 'worms', which is a characteristic of clay soils.

(d) *Coarse components*

The size of stones present and, if necessary, the composition should be recorded and an attempt made to estimate the percentage of stones in a horizon or deposit. The following categories may be used:

Very small	2–6 mm		
Small	6 mm–2 cm	Gravel	
Medium	2–6 cm	Pebbles	Terms used to describe well-rounded stones
Large	6–20 cm		
Very large	20–60 cm	Cobbles	
Boulders	> 60 cm		

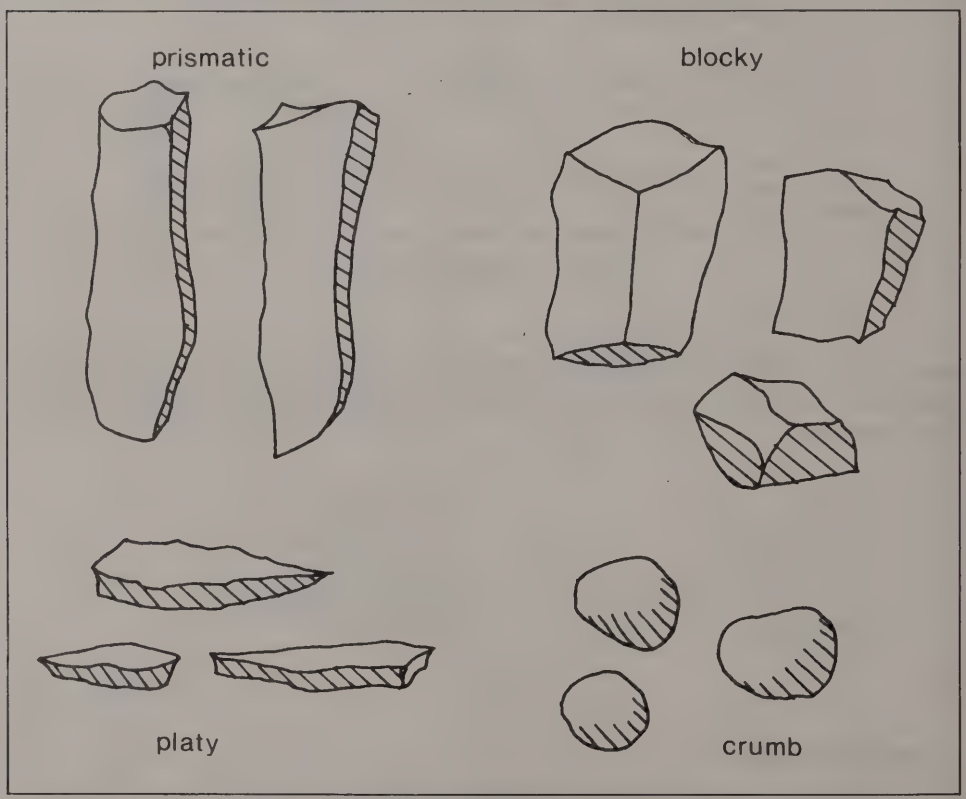

Fig. 4 Soil structure.

A record should be made of the degree of roundness or angularity of stones.

In addition to the detailed description of horizons or deposits, the gross characteristics of sections should be noted, e.g. dip of layers, orientation of stones, noticeable trends in grain size, the presence and nature of organic layers, lenses or inclusions. This may be supplemented by other pertinent observations, such as the presence of foreign stones and artefacts, the structure of deposits where this is obvious (see Fig. 4), abundance and size of modern roots, the presence of old root channels, soil porosity and signs of disturbance of the stratigraphy, e.g. by earthworms or animal burrows.

Site problems

1. *Soil colour*

The colours of soils and deposits often cause confusion on archaeological sites and the most common are described below:

(a) *Red (including orange and reddish brown).* The occurrence of reddish colours in archaeological deposits is often interpreted by the excavator as an indication of burning but may in fact be the result of iron movement in the soil, caused by waterlogging or iron pan formation for instance, which leads to a discrete build up of ferric iron oxides. The presence of archaeological features often affects soil redox conditions (i.e. whether there is a predominantly oxidising or reducing environment), leading to re-distribution of iron in deposits. Soils derived from reddish brown parent materials such as Old Red Sandstone, Devonian slates and Keuper Marl are often very reddish in colour (see Plate I) and this may mask the effects of pedogenic or anthropogenic factors, including the presence of buried land surfaces.

It is important that the excavator can distinguish between burning and other phenomena producing red colouration in soils and it is hoped that the following guidelines will facilitate this distinction.

(i) Is the colour due to burning? The colour of the soil is determined using a Munsell colour chart. Subsequently a sample is ignited, e.g. in a porcelain crucible or on a nickel crucible lid held in tongs over a gas burner allowed to cool and the colour redetermined. If there is little change in colour it can be assumed that the reddish colour is due to burning. Unfortunately the intensity of redness of a deposit is not an indication of burning temperature (Macphail, 1979). If ignition results in a change in soil colour another explanation is required, as follows:

(ii) Is the local soil a podzol or gley? Plates II–IV are of, respectively, typical Humus-Iron Podzol, surface water gley and ground water gley soil profiles and these are shown diagrammatically, with other soil types in Figs 5–7.

In a podzol two horizons are of reddish hue, i.e. the Bfe (the thin iron pan) and the Bs (a much thicker sesquioxide horizon. Gley soils may also contain iron pans but a characteristic feature is the presence of rusty mottles, which may occur in several horizons (particularly the Bg).

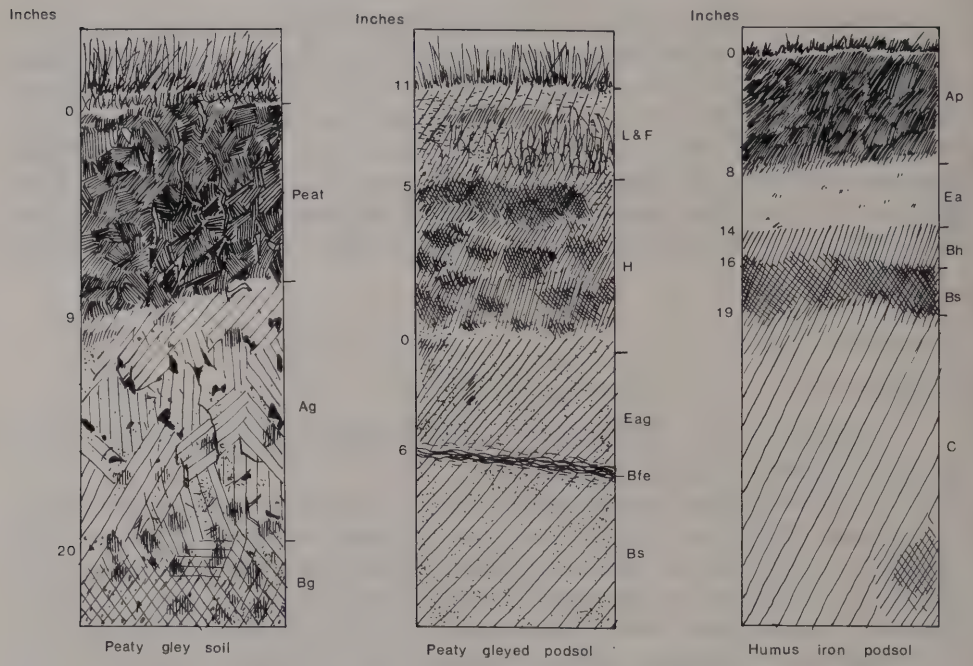

Fig. 5. Representative soil profiles.

(iii) Is the local parent material of reddish hue? Plate I shows a Brown Earth developed on red parent material. Although the colour of the A horizon is usually modified by the presence of organic matter, lower horizons will reflect the colour of the parent material.

(iv) Is the red layer clay-rich compared to other parts of the soil? If so, this may be a Bt or Ct horizon, i.e. a clay-rich (argillic) zone resulting from translocation of clay down the profile. A paleo-argillic horizon, or part of a pre-existing profile buried beneath a younger deposit, may be represented; the fomer is normally reddish and with features generally attributable to pedological re-organisation before the last (Weichselian) glacial period (Avery, 1973).

The presence of reddish colours in archaeological deposits is often, therefore, a reflection of the local soil type and unrelated to specific human activities on the site.

Several iron pans may be found at different depths in a section and these often represent variations in the height of the water-table; this is particularly noticeable in gravel deposits (see Plate V). In waterlogged, anaerobic conditions iron is reduced to the ferrous (Fe^{2+}) form, which is more mobile than ferric (Fe^{3+}) iron. On reaching an oxidising environment Fe^{2+} becomes Fe^{3+} resulting in precipitation of iron, usually as an oxide. Iron pans may also form as a result of compaction, e.g. beneath earthworks (see

Plate VI), and often respect the boundaries of features where there is a marked contrast in the nature of the deposit and, consequently, the soil redox potential. Redistribution of iron in soils may, therefore, be caused by human activity associated with the occupation of a site, although the effects are generally post-depositional.

(b) *Black*. Black colouration in soils is usually attributed by archaeologists to the presence of charcoal but it may be caused by humus (*in situ* and illuvial) or manganese oxides. Therefore it is important for the excavator to be aware of the soil processes leading to accumulation and movement of organic matter and precipitation of black manganese oxides, and to be able to distinguish between these and charcoal. The following questions may thus be asked:

(i) Is the local soil a podzol? By referring to Fig. 5, it can be seen that an iron-humus podzol has two black horizons – the Ah and Bh. The Ah is generally friable, humose, with fine structure in coarse blocky and abundant fine roots, overlying the bleached Ea horizon. The Bh horizon is firm, humose, structureless, with a few roots, overlying darker brown horizons than the previously mentioned Ea; this horizon often contains some fine charcoal.

(ii) Is the soil a gley? In gley soils manganese staining may occur in the Bg horizon (see Plate VII) and Figs 5 and 6). This may be found coating ped faces (i.e. the structural units) and smears a purplish colour.

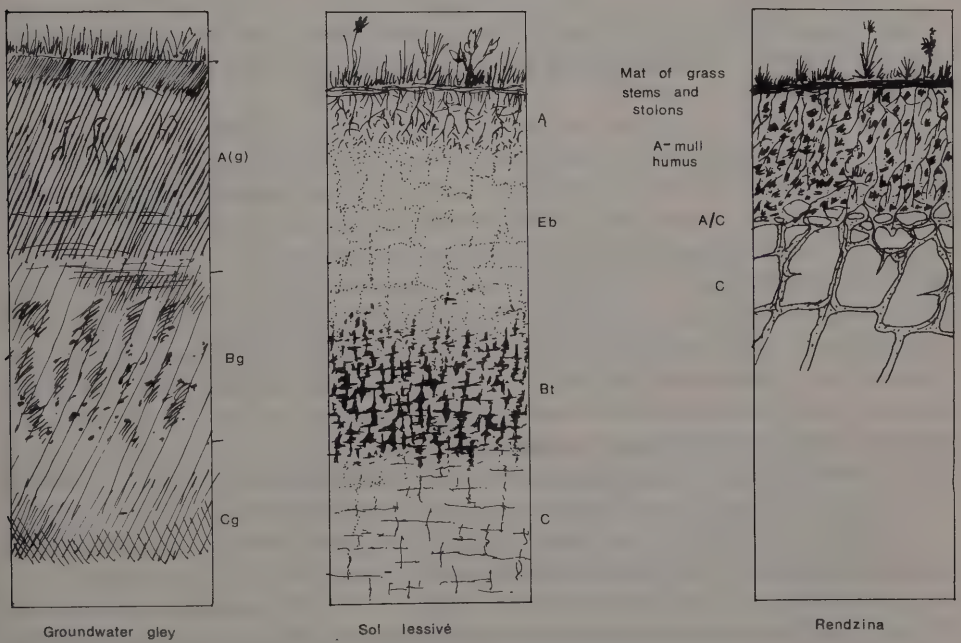

Fig. 6. Representative soil profiles.

The presence of black colouration may therefore be a function of soil development. As in the case of iron, the presence of black manganese oxides may be the result of changes in the soil caused by occupation of the site, e.g. compaction. Two chemical tests, which may be carried out on site to distinguish between black materials, are described below:

(a) To distinguish between black manganese oxides and charcoal.

Take a small pinch of potassium chlorate ($KClO_3$) in an evaporating basin and heat until it melts – CARE! Then add a small piece of the material to be tested. Carbon reacts violently, glowing red; manganese oxides fizz gently leaving a pinkish residue.

(b) To distinguish between humus and finely divided charcoal (large pieces of charcoal are morphologically distinct).

Take about 5 ml of 3 normal sodium hydroxide solution (3N.NaOH) in a test tube and add the material to be tested. (A normal solution is the equivalent weight of the compound dissolved in 1 litre of distilled water.) Shake well – CARE – this solution is corrosive. Charcoal remains as black particles in suspension but humic material goes into solution, giving the liquid a brown colouration.

In an area where the soil is a podzol, difficulties may arise in distinguishing between a buried topsoil (bAh) and a Bh horizon. Here the excavator will need specialist advice from a soil scientist, possibly backed up by pollen analysis and/or soil micromorphological investigations.

(c) *Grey*. Grey colouration may be the result of intense waterlogging, eluviation of iron and organic matter or the presence of ash. The Ea horizon of a podzol (see Fig. 5) is often light grey in colour due to the removal of organic matter by eluviation (leaching). Grey colours occur in gley soils (the Eag horizon), particularly those waterlogged for a large part of the year, and water-lain sediments due to reduction of iron in anaerobic conditions. Ash should be fairly easy to distinguish from grey soil horizons – it has a much lower bulk density and is very fine textured. A qualitative phosphate test (Eidt, 1973: Schwarz, 1967) may be used to confirm the presence of ash, which generally has a much higher phosphorus content than the surrounding soil (excluding occupation deposits). Such a test is described below and can easily be carried out on site, although the solutions will probably have to be made up elsewhere.

Solution A: 5 g of ammonium molybodate are dissolved in 100 ml of cold distilled water, to which 35 ml of concentrated nitric acid are added – CARE!

Solution B: 0.5% solution of ascorbic acid in distilled water – this deteriorates rapidly and should be freshly made each day.

About 50 mg of soil is placed in the middle of a filter paper and two drops of solution A added, allowing it to spread and wet the sample. Then two drops of solution B are added and a blue circle will develop around the sample in about 30 seconds to a few

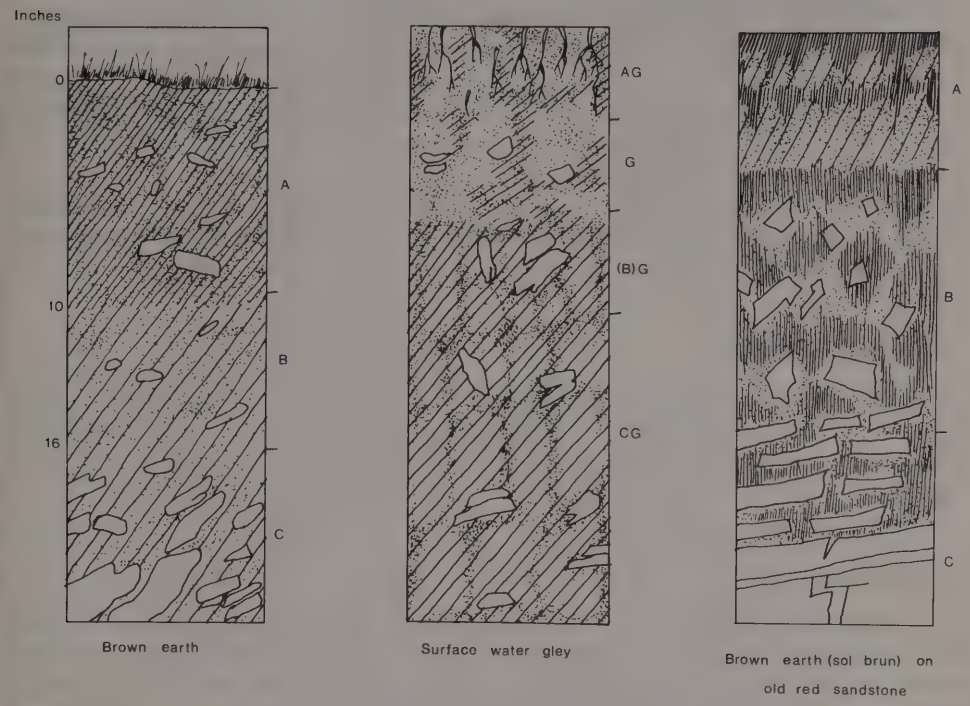

Fig. 7 Representative soil profiles.

minutes, if phosphorus is present. A rough scale can be produced for phosphorus concentrations as follows:

0–0.08% P_2O_5

1. Trace, blue colour up to 2 mm from the sample (0.08–0.15%).
2. Weak, circle – blue rays emerging (0.15–0.4%).
3. Positive, distinct band 10–15 mm diameter (0.4–0.8%).
4. Strong, large blue spot, 20 mm diameter (> 0.8%).

N.B. These concentrations are very approximate.

(d) *White*. White materials include calcium carbonite, gypsum, ash, shell and powdered bone and should not be difficult to distinguish *in situ*. To confirm the presence of calcium carbonate a few drops of dilute hydrochloric acid (dilute HCl, i.e. about 2 normal) should be added to the material, which will effervesce.

(e) *Green*. Gleyed soils and water-lain sediments which are intensely anaerobic sometimes have green colours, caused by the presence of various reduced iron compounds. Blue-green colours in occupation deposits may be produced by the decay of copper or bronze objects, which would be fairly obvious to the excavator.

Where high concentrations of nitrogen, phosphorus and organic matter occur, e.g. in cesspits, light green colours are sometimes seen, which probably represent the formation of iron compounds with the aforementioned materials, although these have not been investigated. A qualitative spot test for phosphate, as described previously, may be used to confirm that the green material is the result of human activity.

(f) *Blue*. Bright blue vivianite (Fe_3 $(PO_4)_2.8H_2O$), turning brown on exposure to air, sometimes occurs in occupation deposits and is easy to recognise. Not a great deal is known about vivianite formation in archaeological deposits; in fact a detailed investigation of iron compounds in archaeological deposits is long overdue.

2. Colour of stones

Red flints are often assumed to be burnt when in fact they are jasperised (jasper is an impure form of compact quartz). Burnt flints tend to be grey rather than red (unless the patina is affected by iron oxides in the soil) and show an overall fracture pattern and fragmented edges.

3. Concretions

Iron and manganese concretions often occur in soils, particularly gley soils (see Plate VII) where concretions of Fe and/or Mn with varying amounts of associated organic matter can be found, and these may be confused with artefactual material. Iron and/or manganese-rich gravels may contain quite large iron oxide concretions or panning may initially be interpreted as corroded iron objects (although subsequent X-ray photography should allow distinctions to be made) and therefore care must be taken by the excavator to note the local soil type in case such natural phenomena are likely to occur. Manganese concretions and humic material can be distinguished from charcoal as described in section 1(b).

4. Miscellaneous features

The presence of periglacial features may cause considerable difficulties in site interpretation, e.g. ice wedges (Fig. 8) may be confused with ditches and stripe features (Fig. 9) with plough marks. Solution hollows often occur, especially in areas of calcareous soils, and these may resemble pits. Variations in the depths of soil horizons and profile truncation may cause confusion in interpretation. Examples of some specific problems are described below.

(a) (see Fig. 10). In an area of blown sand humus-iron podzols had formed; at the top of the soil, the Ah horizon (topsoil) had been buried by a more recent cover of sand and a new Ah horizon formed. During preliminary excavations the Ah and Ea (leached) horizons were removed, exposing the underlying Bh horizon in places. Such a Bh horizon may be mistaken for an Ap horizon (plough soil), as it is dark in colour, and limited

Fig. 8 Examples of periglacial features.

Fig. 9 Aerial view of a rectangular pattern of soil polygons in northern Alaska.

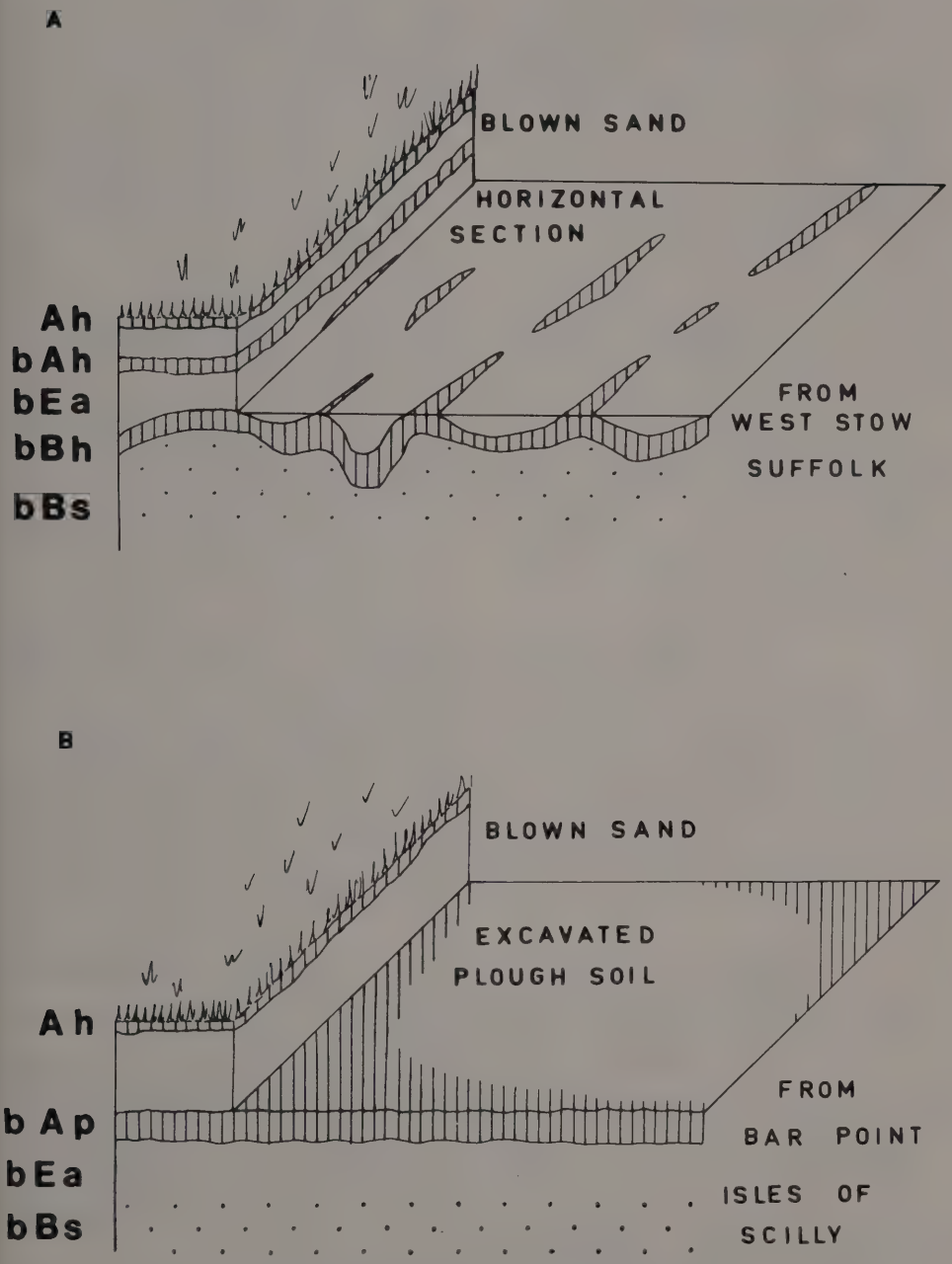

Fig. 10 Interpretational problems under blown sand.

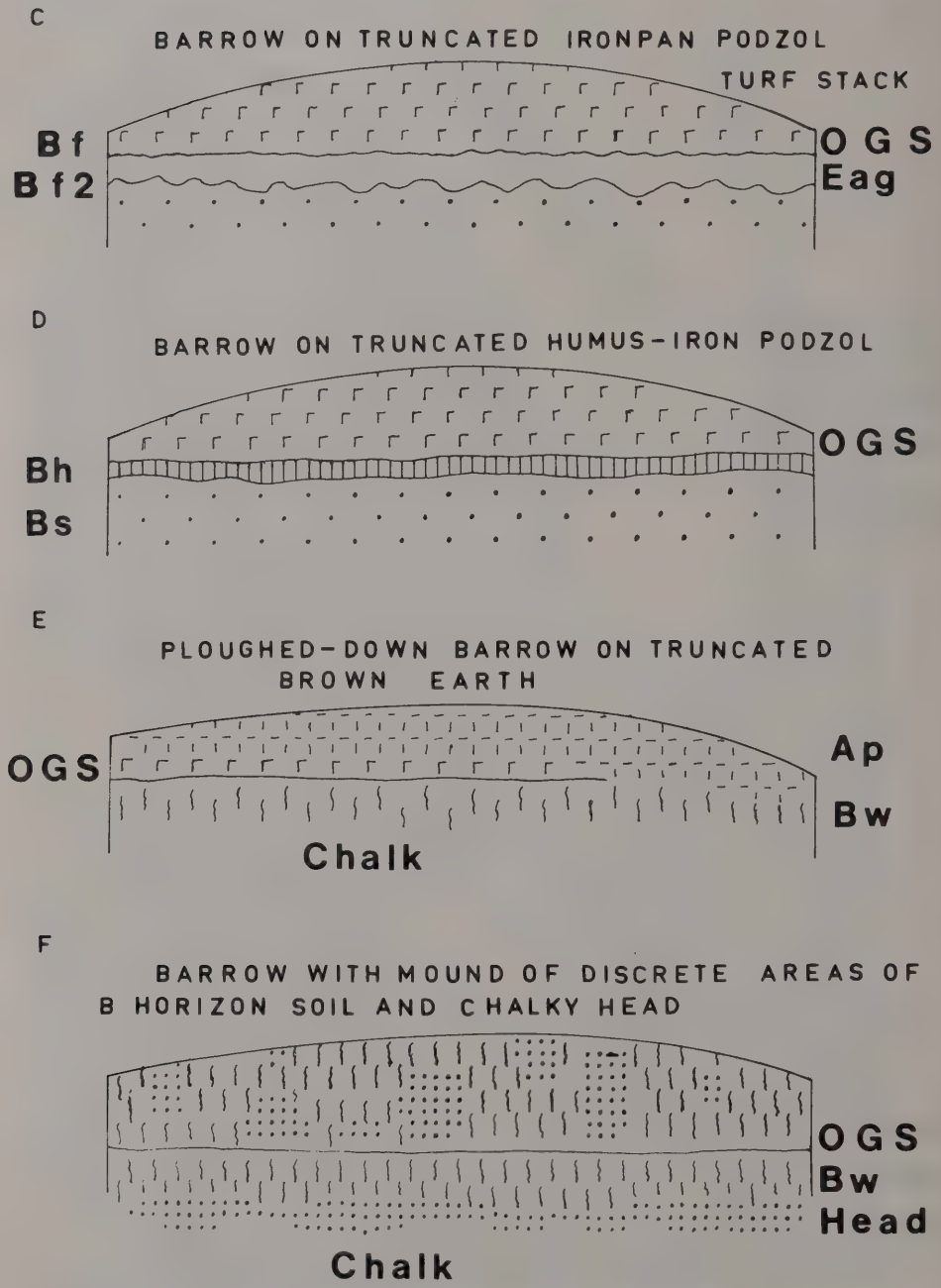

Fig. 11 Problems associated with soils under barrows.

exposure due to undulations can give the appearance of plough marks. Distinction is easy however since, as mentioned earlier, the Bh horizon is often partially cemented, with few roots, and overlies a dark brown Bs (sesquioxidici) horizon. In contrast, an Ap horizon in this situation would probably overlie the remains of an Ea horizon, which itself occurs above an illuvial zone.

(b) (Fig. 10). An example of the latter is illustrated.

(c) Complications may arise where the natural soil has been disturbed by construction of a barrow and examples are shown in Fig. 11. Here an iron pan (Bf) has formed along the old ground surface (OGS) at the junction of the turf stack and the truncated iron pan podzol profile, probably due to compaction. This should not be confused with the natural iron pan (Bf_2) as it lies above the grey Eag (eluvial) horizon.

(d) The natural soil has been truncated as far as the Bh horizon, which could be confused with an Ah or other surface horizon, but careful inspection of the horizon sequence will clarify this.

(e) Modern disturbance, particularly ploughing, can affect stratigraphical interpretation and this is particularly evident in ploughed-down barrows on chalk, where the old ground surface may be destroyed as the mound is eroded.

(f) The barrow mound may be made up of soil materials of varying composition, taken from different horizons.

Summary

There are many soil phenomena which may confuse the archaeologist during the excavation of a site and an attempt has been made here to list the more common ones. It is hoped that this paper will help excavators to be aware of natural soil features and to recognise phenomena associated with their own archaeological sites, without necessarily having to resort to advice from an outside specialist. There are very few pedologists working in archaeology and it is therefore extremely useful if excavators can achieve at least a small degree of self-sufficiency in this area.

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Plate I Brown earth development on reddish parent material.

Plate III Surface water gley.

Plate II Typical humus-iron podzol.

Plate IV Ground water gley.

Plate V Gravel deposit containing several iron pans.

Plate VI Iron pan formed beneath the turf mound of a Bronze Age barrow.

Plate VII Surface water gley containing concretions of iron and manganese oxides at depth.

Book Reviews

Correction

Institute of Archaeology *Bulletin*, 17, 1980: 157–8 Review of Coldstream, J. N. and Colledge, M. A. R. (*eds*), *Greece and Italy in the Classical World. Acta of the XI International Congress of Classical Archaeology, London, 3–9 September 1978.*

In the review of the above publication (which contained summaries of the papers presented to the Congress), the reviewer stated that the volume was 'disappointing because of the high hopes [for the full publication of the papers] which it had aroused'. Professor Coldstream and Dr Colledge have written to point out that this misrepresents the situation. The decision to publish the papers in summary form was taken at an early stage in planning the Congress and was announced to all Congress members in the final circular, so that no hopes should have been aroused.

WAINWRIGHT, G. J. *Gussage All Saints: an Iron Age settlement in Dorset* (Department of the Environment Archaeological Reports No. 10). London, HMSO, 1979. xi + 202 pp., 113 figs., 49 tables, 37 pls. £18.00.

This report presents the results of the total excavation of the antennae enclosure carried out in 1972. Details of the radiocarbon dating have been published previously (Wainwright and Switsur, 1976), and there has been one interim report (Wainwright and Spratling, 1973). The single most important discovery, the debris of bronze and iron working carried out at the settlement, is reassessed in this publication by M. G. Spratling. (It is also the subject of a separate publication, Foster, 1980.) The debris is not thought by him to be the result of metalworking by itinerant smiths, but probably to have formed a permanent part of the economic life of the settlement. The implications which this interpretation has for the social status of the site is discussed by H. C. Bowen, who also relates the site to contemporary archaeological features of the area. Other specialist contributions include chapters on the pits, ceramic fabrics and fine wares, stone artefacts, animal bones, human bones and the plant remains. The report is well presented, and the illustrations are of a high standard.

One aim of the excavation was to establish the socio-economic status of Little Woodbury-type settlements. Unfortunately at Gussage the upper levels were eroded, destroying evidence of the lighter structures, and, apart from the pottery and metalworking debris, the site produced relatively few artefacts.

Given the aims of the investigation, and the investment of expertise, some would have been tempted to give the recovered evidence a wider significance than could be justified. In this case no extravagant claims are made, and the concluding chapter is an extremely clear and balanced assessment of the report's findings. However the author's discussions and concluding remarks to sections are generally brief, and there are ambiguous aspects to the interpretation of the site which might have been overcome had fuller explanations been given.

A major difficulty concerns the methods used to establish chronology. Few of the interior features are in stratigraphic relationship, and are therefore dated 'purely on ceramic grounds'. However, the pottery report refers to 'dated contexts' as a means of assessing the chronological distribution of ceramic forms, and it appears that a circular argument is being employed.

The radiocarbon dates put forward to support the chronological divisions are calculated to one standard deviation, so that, statistically, one-third of the archaeological contexts so dated would be expected to fall outside the calibrated ranges of 200–300 years. This, on a site with a presumed occupation period of 500–600 years, together with the stated overlap of pottery forms and fabrics casts serious doubt on attempts to trace the evolution of the site via features which are not in stratigraphical relationship, and this also extends to non-diagnostic artefacts recovered from these features. For example it is stated that, as rotary quern fragments were found in Phase 1 pits, they are likely to have a greater antiquity than was previously assumed. This cannot be so while the status of Phase 1 is equivocal. A La Tène III fibula datable to the 1st century AD (find no. 1100) is assigned to Phase 1,

on context and association with 'Phase 1' material. It seems possible that Phase 1 may therefore be later than is assumed. It would have been useful if representative groups of associated material, particularly those containing diagnostic artefacts of an early date such as the La Tène I fibula, had been illustrated, as the format does not allow the reader to reconstruct artefact groupings easily.

The strength of the report lies in its descriptive detail and the restraint and clarity with which the final assessment is made. The metallurgical debris, which includes 7,000 fragments of lost-wax moulds, unique in their fine state of preservation, is discussed in an extremely interesting and informative chapter by Dr Spratling, and this stands as a major contribution. The sections on ceramic fabrics by F. E. Gale, quernstones by D. G. Buckley, animal bones by R. Harcourt, and the human bones by C. Keepax also offer constructive commentaries. The plant and animal economies at Gussage appear to be in line with the evidence recovered from contemporary sites. However, the possibility that horses were gathered from free-ranging populations on reaching maturity, combined with the suggestion that chariots and harness fittings may have been made and leather working carried out at the site, raises interesting implications for the industrial status of Gussage. In his conclusion, Dr Wainwright asks whether it is more productive to investigate small economic systems such as that to which the Gussage settlement appears to belong, or to concentrate on one-off rescue excavations. The results at Gussage seem to indicate that the former is preferable, as it is unfortunately still impossible to say whether the human remains found at the settlement represent 'arthritic farmers', or members of a chiefly or craftsman caste.

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CHRISTINE WILSON

JOHNSON, S. *Later Roman Britain* (Britain before the Conquest). London, Routledge and Kegan Paul, 1980. ix + 192 pp., 20 figs., 60 pls., 22 maps. £7.50.

This book deals with later Roman Britain from the inside and the outside. The introductory chapter is a very established view of the Roman province in which history is given quite unjustified priority over archaeology, then follows a synopsis of the enemies of Britain and their attacks, the defences of the province, on which the author is an expert, the history of the Anglo-Saxon invasions, and the arrival of the invaders, with a final series of half-baked thoughts on the continuity of settlement. It will be evident that I take greatest exception to the first and last chapters with less to complain of in the Anglo-Saxon parts; since neither Stephen Johnson nor I are experts in the pagan Saxon period, this might mean no more than that we are both equally out of date in our views of the Germanic invasions. The tone of review is therefore one of trenchant niggle which, I hope, will neither hide a deep-seated disagreement, nor cause it to sunder a long-standing friendship.

Roman Britain is, for me, either a prehistoric study, or, at best, a proto-historic period. There are virtually no direct historical sources produced in the province so that an historical approach inevitably has to drag in parallels from the rest of the Empire, and wring the maximum juice from throw-away lines and half sentences in Roman writers who regarded the province as akin to a Roman Siberia. Johnson takes this method to its limits, in the historical tradition of writing on Roman Britain. I wish to start all over again, and build a new and better picture from archaeology. Take, for instance, Johnson's fixation with decurions. From his text, in which they occur liberally, it might be thought that source material on them is abundant; in fact we know of perhaps 10, and all our other 'knowledge' is simply illegitimate extrapolation from other provinces. This depends on the assumption that Roman Britain is a microcosm of the whole Empire; prove it.

Even the historical sources get cavalier treatment. The integrity of the *Notitia Dignitatum* is questioned (p. 97) on no better grounds than the fantasies of scholars who find that it does not say what they want it to. The two St Patricks, early and late, are dealt with mathematically, that is to say their dates are averaged out, thus agreeing with none of the historical sources. A Patrick born in 410 (p. 117) is late, to have him trained by Victricius of Rouen (p. 22) makes him early, to take him to Ireland 10 years after Palladius (431) makes him 'intermediate', neither 432 or *c.* 460; to say the least, this process of averaging out is an unusual application of mathematics to history.

The archaeological sources receive uneven treatment. Pottery is dealt with in a very traditional way by keeping all the industries of Roman Britain in full production until the magic year of 400, and then collapsing them by 425. The dates are sheer fantasy, as the author knows, and he ought to have pointed this out; the industries might end a quarter of a century earlier, and the 'collapse' is totally undocumented (pp. 155–6). Having killed off the dating by pottery the author totally confuses the unsuspecting reader by dating sites such as Cad Cong and South Cadbury to the 5th century without explaining that this is imported exotic pottery subject to different rules (p. 159). Johnson does not always stick to the tenor of the publications that he quotes as evidence, thus, the Lankhills newcomers to Roman Winchester are traced back to Pannonia not, as he says, by the style of their belts, but by their burial rite, and I am doubtful about explaining the origins of the Poundbury cemetery as a private burial ground of a courtyard house (pp. 97 and 169).

A crop of other questions spring to mind. How do you prove the proliferation of mystery cults in Britain in the 3rd and 4th centuries (p. 32); can you really show that coin hoards of *c.* 270 are concentrated in the south and east (p. 72); why is the PR REL who presumably went to Lydney for his health to be located in the West (p. 90); on what do these Irish Patrician monasteries depend (p. 118); how can a Roman territorial boundary survive (p. 143); and is it really fair (p. 169) to imply that Constantine's great Basilica of St Peter's was a 'small simple building'?

But there are signs of grace. Johnson often gives the standard, to me inadequate, explanation of an event, or a site, only to cast doubt on this in the final phrase or sentence of a paragraph. In one case (pp. 96–7) he actually comes out and savages the universal date of 367 which is applied indiscriminately to all 4th century ills. If only he had done this much more often and much more forcibly this could have been a very much better book. Or do I mean that it would have been much more like the book that I would have written?

RICHARD REECE

HOLDER, P. A. *Studies in the 'Auxilia' of the Roman army from Augustus to Trajan* (BAR Int. Ser, 70). Oxford, British Archaeological Reports, 1980. 352 pp., 11 pls. £11.00.

This study is based on a Manchester Ph.D. thesis of 1978. Eight chapters and a conclusion cover the topics: unit strength and organisation; unit nomenclature; individual and unit awards for valour; citizenship and Latin status; citizen units; the equestrian officer career; centurions, decurions and principales; recruitment; the development of the auxilia. There are appendices on the dating of tombstones, the diploma lists, and the regiments, and a very useful collection of epigraphic evidence under the title of prosopography, with indices for topics and the names of equestrian officers.

As a thesis this is a very interesting and stimulating piece of work covering the important field of the development of the auxilia up to the reign of Trajan. As a book it is less satisfying because of the limitations that such a time span imposes. If Holder had waited to publish until his studies had embraced the post-Trajanic period in the depth attempted in this book he might have had second thoughts about some of his conclusions, particularly those in Chapter 4 on citizenship and Latin status, where he brings in evidence from the Antonine period to support some of his arguments but is able to avoid discussing the matter fully by statements like 'even if this was a grant of Latin status to an auxiliary, it has no relevance to the period before Hadrian' (p. 51). It is unfortunate that his style of writing gives an air of certainty to some things which can only be a matter of opinion, for example the assigning of Roman citizenship to individual auxiliary soldiers who give filiation by gentilicium or cognomen. The discussion of diplomas also falls short because he is unable to consider the implications of the changes in formula of *c.* 140 – there are, in any case, more questions to be examined than his rather simplistic treatment of the subject of legionary commands of the auxilia and the issue of diplomas.

On the credit side his presentation of the evidence in tabular form with clear reference to his inscription numbers is extremely useful, and the solutions offered for individual epigraphic problems are always thought provoking, in many cases extremely satisfying. In any revised or expanded edition it would be helpful if cross references were provided by noting the relevant table and page numbers after each inscription.

The discussion of decorative stylistic features as clues to the dating of tombstones – long overdue in an English study – provides a helpful summary of work done by Continental scholars in particular, although this reviewer has reservations over the degree of accuracy that may be assigned to dates from art forms and workshops which is promoted in statements like 'These are stylistically better, and hence belong to the Claudio-Neronian period' (p. 145).

Taken as the precursor of a fuller study of the auxilia this is a valuable indicator of things to come. It is to be hoped that Holder will keep up the good work.

MARGARET ROXAN

Landscape History. Journal of the Society for Landscape Studies, Vol. I, 1979.

The job of reviewing a new journal is rather more daunting than the more usual task of reviewing a book which has been written once for all. Unless the journal is disastrous it will probably go on for many further issues, and unless the reviewer knows nothing at all about the subject he may have his eye on the new journal as an outlet for his own unpublished papers; in either case extreme opinions could cause difficulties. I will therefore declare an interest both in the subject of landscape history through the subject of hedge survey, and the journal under review, which might be just the place to put some of my hedge data. The amateur interest in hedges, and the obsession with the Cotswolds will colour my view of the contributions assembled in Volume I, but I will try to give an honest opinion of the whole enterprise.

Unfortunately a second preamble is necessary: I think it is relevant for it picks out some of the problems which the editor of the journal has either faced already, or will have to face in the future. One of the main problems with nearly every form of study of the landscape is the very large amount of work which has to be put into a small area of countryside in order to extract only a small amount of publishable, or perhaps better, readable, material. A catalogue of Roman coins is much more instantly rewarding for the catalogue itself is usually considered worthy of publication, and the necessary commentary can grow quite painlessly out of years of experience, distilled in one afternoon in a warm study. The basic data of the landscape and its history are not at present judged worthy of publication, they have to be gathered and checked on the hoof, and the distillate of months of work, miles of walking, and sheaves of notes may often be no more than two or three published pages. If this process is not followed in the new journal I give little for its chances of success for every devotee of the landscape is ferociously interested in the landscapes he knows, and can be highly intolerant of others. He is therefore willing only to read about ideas and methods of wide application and novel use, and, probably quite rightly, will read only the first paragraph of a blow by blow account of the possible bounds in a Saxon charter as paced out on the ground. How then does this new publication fit into my preconceptions, as judged by the first contributors?

The volume opens with what I think is a psychological mistake – a worthy paper rather than an exciting one, a paper which goes methodically through examples rather than skipping round a series of alluring hypotheses. Add to this the fact that it is about the reconstruction of early tenurial and territorial divisions of the landscape of Northern England – miles from the Cotswolds and totally different in administrative patterns – and you will see my dilemma. My reservations say absolutely nothing about the quality of the paper; I am sure that this is high, but they do say something fairly basic about the problem of communication of detailed and localised studies whose examples are all drawn from a limited area of the countryside. James Pickering on aerial archaeology and the prehistoric landscape branches out into much wider issues, and Richard Smith on environmental issues in landscape studies ranges so widely that the words must be spread out at a ration of about two words per thousand square miles, which means that he seldom has time to get down to anything in detail. He gives a number of pollen diagrams, but the text is moving so fast that little information is extracted from any of them; it can hardly be hoped that all other readers will have the necessary expertise to interpret them for themselves.

Oliver Rackham hits just about the right note with a general survey of documentary evidence for the historical ecologist which includes specific examples in fair detail, but also a measure of humour, individuality, challenge and authority. Margaret Faull attempts to derive general points from a specific study of place names in the Adel township, near Leeds, and manages, I would say rather against the odds, to make a very local study of wider application; the same is true of Stephen Moorhouse's study of the landscape of the Manor of Wakefield in the middle ages. Three very different papers on the estates of Abingdon Abbey, regularly planned villages in Scandinavia, and the study of the landscape in modern tropical Africa complete the volume.

The challenge therefore is obvious; landscape studies can only be of high quality if they are intensely local, painfully thorough, and of little interest to any save the worker at the field-face. But sometimes such work will throw up ideas of wider import and these, suitably thought out and prepared, will be the food of this journal. There is enough success in this first volume to look forward with great interest to the next issues, and perhaps enough certainty that the project will be well received to get out the hedge data and get working on it.

RICHARD REECE

BERESFORD, M. W. and ST JOSEPH, J. K. S. *Medieval England, an aerial survey,* 2nd edn. Cambridge, Cambridge University Press, 1979. xvii + 286 pp., 118 figs. £10.00.

ROWLEY, T. *Villages in the Landscape* (Archaeology in the Field Series). London, Dent, 1978. 211 pp., 37 figs., 26 pls. £5.95.

The first of these books is the second edition of a classic work, the second a contribution to the Archaeology in the Field Series. Each deals with the English landscape, but each tackles the subject in a very different way.

In the words of the authors, *Medieval England, an aerial survey* 'has been conceived as a work of observation, illustration, comment and suggestion. Its source is the English landscape viewed from the air, and it selects what can be seen from that point of vantage to illustrate the visible remains of human activity.' Its aim is not to give a total coverage of the English landscape in the middle ages, but to present air photographs of selected sites, many of which can also be illustrated by early maps and most of which are mentioned in medieval documents. Much space is also devoted to sites which never benefited from early cartography, but whenever possible 16th and 17th century maps are reproduced alongside the appropriate photographs. The result is a book which is not only beautiful to look at but also thoroughly scholarly and highly informative; a book to covet and consult.

The publication is divided into four parts: an introduction which deals succinctly with the aims and limitations of the volume and the question of early maps and plans, a section on fields and villages, one on towns, and finally a short section on industrial and other remains. Within each section each individual site is illustrated by an oblique air photograph and an early map or plan where possible, and accompanied by a descriptive text and bibliography. There are also introductions to each section or sub-section, in which Professor Beresford discusses the subjects in general and sets the specific sites in context. Not surprisingly for one who has produced works on deserted medieval villages and medieval planned towns, Professor Beresford writes with assurance and authority, and also always with clarity and wit.

The book does not set out to be a textbook for medieval archaeologists, but could almost be treated as one. The introductions to the sections are comprehensive, that on medieval field systems being particularly worthy of mention, and the aerial photographs themselves are indispensable to students of the medieval landscape, rural and urban alike.

Trevor Rowley's book, on the other hand, is confined to the rural landscape and presents a brief survey of the development of the English village from earliest times to the present day. Although prehistoric and Romano-British settlements are described, that section is necessarily brief and the emphasis of the work falls on villages from the Anglo-Saxon period onwards. Probably the most useful section for the student is the chapter entitled 'Fieldwork and the Village' which presents a useful outline of the features to be looked for when studying villages on the ground. The format of the series of which this publication forms one part demands a general rather than academic approach and it will therefore recommend itself to the interested amateur rather than to the professional archaeologist. Regarded in this light, it forms a useful introduction to landscape studies for the general public and will surely find its place on the reading lists of many extramural classes in archaeology.

HELEN CLARKE

MEGAW, J. V. S. and SIMPSON, D. D. A. (*eds*). *Introduction to British prehistory from the arrival of 'Homo sapiens' to the Claudian invasion.* Leicester, University Press, 1979. 575 pp., 225 figs. £19.00 (hardback), £7.95 (paperback).

The book is the product of six writers who, because of their involvement with formulating and teaching university archaeology courses, have aimed to make available to university undergraduates and extramural students a straightforward, fully illustrated reference guide to the raw material and literature covering the prehistory of Britain from the arrival of *Homo sapiens* to the Claudian invasion of southern Britain. The result is a thorough, well-published volume where the format makes maximum use of the pictorial space available, where line drawings and photographs have a good quality of reproduction and where there are but a few printer's errors. Despite the title 'British Prehistory' Ireland receives variable but fairly consistent mention. The narrative is deliberately non-individualistic. The text is accurate and cautious rather than postulative, being more concerned with sites and artefacts than with socio-economic theories. The book is divided into chronological sections with individual writers dealing each with a set period. There is some intentional and healthy overlap in the subject matter dealt with by each writer. The Iron Age is possibly more disjointed in approach for being divided between three writers. This has, for example, resulted in one repeated illustration (figs 7.46a and 7.71).

In the first section John Evans deals with the environmental background. He largely summarises parts of his book *The Environment of Early Man in the British Isles* (1975). The small number of pages (18) devoted to such a large subject has perhaps promoted oversimplification of complex geomorphological and palaeoecological changes, as, for example, with the discussion of sea level changes and the formation of raised beaches (p. 10), while Godwin's pollen zones are used (p. 9) to reconstruct vegetation changes without emphasising that within recent years studies of regional pollen assemblages have indicated that the components of these pollen zones are not necessarily synchronous either ecologically or chronologically.

Mary Jane Mountain's section on pre-agricultural communities gives a balanced ordering of recent views formulated by leading writers on the period. This is followed by three considerable chapters by Derek Simpson on the Neolithic and Early Bronze Ages. Any chance of general discussion of what degree of continuity or acculturation there may be between the Mesolithic and Neolithic seems to have been lost in the transition from one writer to the other. Simpson's chapters are, however, noteworthy for the numerous sites considered within his succinct discussion. The emphasis that Neolithic burial mounds can represent the final process in a sometimes long and complicated sequence of events is important and the placing of Grooved Ware within a cultural context by returning to Piggott's original designation of this pottery as Rinyo-Clacton ware is an imaginative personal touch. The implications of the overlap between native Neolithic traditions and Beakers merits further discussion although recent views on the latter are dealt with particularly well.

Vincent Megaw's chapter on the Later Bronze Age understandably meets the fate of the period in including a large amount of metal typology but this is alleviated by sections on technology and foreign connections. His later section on Iron Age art in southern Britain and Ireland seems tagged on to Tim Champion's section on the Iron Age in southern Britain and Ireland. The latter's approach is more thematic than that of the other sections in the book and the area and period is discussed without reliance on Cunliffe's pottery style zones. An awareness is shown of the particular problems and usage of C-14 dates for the Iron Age. Ian Ralston on the Iron Age in northern Britain provides, in particular, a much welcomed comprehensive look at Scotland.

The volume is given overall cohesion by Morna MacGregor's excellent line drawings. Her redrawings of artefacts, maps and plans from numerous published sources are often improvements upon the originals.

The five years that went into the production of the book have resulted in a conscientious textbook which embraces a great amount of information and is certainly value for money.

SUE HAMILTON

BURL, Aubrey. *Prehistoric stone circles.* Aylesbury, Shire Publications, 1979. 48 pp., 4 figs., 25 pls. £1.25.

GRINSELL, Leslie V. *Barrows in England and Wales.* Aylesbury, Shire Publications, 1979. 64 pp., 43 figs. £1.50.

These two additions to the Shire Archaeology Series represent the editor's first consideration of prehistoric monuments rather than artefacts. As general introductions to their subjects both books may be considered successful, although the approaches adopted by the two authors are very different.

Burl covers the whole of Great Britain and divides his subject into three periods based upon radiocarbon dates. Each period is reviewed in terms of the distribution, construction and use of the circles. Their origin is traced from ditched round barrows and they are seen to evolve in parallel with henge monuments. Stonehenge is rightly treated as an anomaly. Finally Thom's work on the geometry of the circles and the use of the 'megalithic yard' is examined. It is good to find a 'popular' book dealing with the fantasies of mathematicians and astronomers in such an intelligent fashion. Burl rightly notes the paucity of the data-base for such ideas and stresses the evidence for stone circles having been used as ceremonial centres connected with death, burial and the sun.

Grinsell's 'Barrows' is much more a gazetteer of sites to be visited, and he even includes some ideas of a route to follow at one point (p. 18). Although he restricts himself geographically to England and Wales, all periods from the Neolithic to Viking are covered. Within these periods he groups the barrows geographically. Each group is described morphologically and selected grave goods are mentioned. After reading Burl's volume this one seems weak in its interpretation of the monuments. This, in part, must be a reflection of the typological approach which Grinsell uses, and of his overall avoidance of dating.

The production of the two volumes is as disparate as their contents. Burl's volume is well laid out, has illustrations within the text and contains maps illustrating the distribution of the monuments. Grinsell's work has the illustrations crammed together at the end, no maps, an unnecessary set of bracketed measurements in feet throughout, and starts with a glossary as the first chapter.

BRIAN OLDHAM

CAMPBELL, John B. *The Upper Paleolithic of Britain: a study of man and nature in the late ice age,* 2 vols. Oxford, Clarendon Press, 1977. xiv + 264 pp.; xvi + 376 pp; 175 figs., 48 maps. £25.00.

The Upper Paleolithic in Britain by John Campbell is, in the words of the author, an attempt to co-ordinate the study of archaeology and paleoecology in the Upper Paleolithic. Although this two

volume publication is predominantly the results of Dr Campbell's D.Phil. research the book also includes recent research: thereby covering a decade of investigation. A thorough search has been made of the literature and museum collections in order to re-examine old excavations. To complement and expand these results nine cave sites (six that had been formerly excavated and three new ones) and one open air site were excavated. The only detailed reports on these excavations, to date, are found in this publication.

Volume I outlines the methods and concepts of the study, as well as chronology and ecology of the British Upper Paleolithic. Campbell's two major cultural divisions for this period, the Early Upper Paleolithic (EUP) and the Later Upper Paleolithic (LUP) are discussed in relation to cultural material in sections IV and V which is followed by conclusions and suggestions for future research and a detailed and comprehensive bibliography. Volume II is comprised of tables, figures, maps, line-drawings, a listing of C-14 dates and a gazetteer of EUP and LUP and supposed Upper Paleolithic sites.

Bearing in mind the last major contribution to this subject was the 1926 work of Dorothy A. E. Garrod, new light on the Upper Paleolithic in Britain is a welcome sight. However this publication is unfortunately disappointing. Although it is admirable that such an extensive investigation was attempted the interpretation of the sedimentology, pollen analysis, radiocarbon dates and typological and technological analysis are questionable. Specialists in the fields will undoubtedly be cautious of the interpretations and conclusions drawn from what are often very poor or questionable samples. Take for example the two main cultural groups defined by Campbell: the EUP and LUP. The EUP is characterised by 37 sites, only one of which has an artefact count of more than 100 specimens, with the 99 sites of the LUP producing only five sites that contain more than 100 artefacts. Granted the impoverished nature of the British Upper Paleolithic sites has always proved a difficult problem, but is there really sufficient data to establish major cultural groups for this period, and feel confident to assign sites such as Cae Gwyn cave, Flintshire, to the EUP with a total of two speciments (one scraper and one waste flake) or Newhowe Farm, Sussex, to the LUP with a total of four artefacts, three of which are waste products?

The validity of including categories such as snow, or ice, sand or silt, clay, gut, skin, or fur, moss, herb, bark, or wood artefacts, all of which are admittedly only inferred to date, in an artefact material and class level listing can also be questioned. Thought-provoking though their inclusion may be it would perhaps be wiser to list these possible tools and their related ethnographic inferences in a separate section from the type list that formed the main body of the lithic analysis.

Although the need for abbreviated terminology for the many recognised tool types can be appreciated the use of capitalised forms, combined with constant references to equally capitalised stratigraphic levels, and the previously noted EUP and LUP terms led to rather arduous reading in many sections. It well might have delayed publication but this work would have also benefited from some rather drastic cuts of overly long descriptions and occasional rewriting to remove endless lists of abbreviations in favour of longer, but readable, sections and chapters.

John Campbell has without doubt devoted a vast amount of time and energy to this project. Sections of the work are of definite value, for example the comprehensive bibliography, the gazetteer and the many line-drawings of new finds (which are unfortunately poorly reproduced). However major failings in the initial stages of analysis leave the reader with constant nagging doubts.

SHEILA COULSON

CRAWFORD, Harriet (*ed.*) *Subterranean Britain: aspects of underground archaeology.* London, John Baker, 1979. xv + 201 pp., illus. £7.95.

Every now and again, as the field of study broadens or techniques progress, there comes an opportunity to subject some special aspect of archaeology to a more detailed and penetrating examination than it has so far received. Subterranean archaeology – the study of man's activities below the earth's surface, is one such example. The recent increase in interest in this aspect of the past can probably be traced to the founding in 1977 of the new national organisation *Subterranea Britannica,* largely due to the untiring efforts of Sylvia Beamon, to whom this book is dedicated. Although it is not mentioned, even in the foreword, *Subterranea Britannica* is surely the source of inspiration for this book, which brings together for the first time a collection of papers dealing specifically with this particular aspect of archaeology in Britain.

The introduction outlines the ground to be covered, discussing the use of the subterranean over the millennia for industrial, domestic and ritual purposes. It is made clear that because of the nature of the evidence from these islands, and the deliberate decision to exclude funerary monuments, the book is mainly concerned with the exploitation of natural underground resources with which the British Isles are particularly well endowed. Four of the six chapters are thus concerned with mining – from the extraction of flint and, later, gold and other metals in prehistoric times, through the development of

mining techniques in the Roman period, to the mining of coal and metals in the industrial era. A useful chapter-by-chapter summary of contents guides the reader directly to topics of special interest.

The first chapter by G. Sieveking is a must for all prehistorians, providing as it does a valuable and up-to-date summary of the evidence for flint extraction in Europe during the Palaeolithic and Mesolithic as well as the peak production period of the Neolithic. New evidence resulting from the most recent investigations at Grimes Graves has made it possible to reconstruct the methods of extraction believed to have been used by the Neolithic miners and to compare this with other flint mines in Britain and on the continent. It is good to have this report on the British Museum's project at Grimes Graves, with its far-reaching consequences for the study of prehistoric mining.

The second chapter by J. Barnes starts with a comprehensive survey of the most important metals and their geological setting. Dr Barnes then goes on to discuss the evidence for early mining and the methods used by ancient miners, though these are hard to define except by analogy with later mining areas. More concrete evidence from the Roman period in Britain is described by Professor Barri Jones in Chapter 3 and includes a recent survey of the Roman copper mine of Llanymynech by the Shropshire Mining Club, as well as the Roman mine at Draethen, Gwent, located in the 1960s by the Bristol Mining Club. The new evidence presented in this chapter will be of interest to all concerned with Roman Britain as well as with the history of mining.

One of the most important contributions to the book is the chapter on Irish souterrains by Richard Warner. Here, for the first time, the construction techniques, chronology and function of these monuments is fully discussed in the light of the historical and archaeological evidence now available. Some interesting results have emerged. First it can be shown that souterrains were constructed and in use in Ireland during the Later Iron Age (Early Christian Period) from the 6th to 12th centuries AD, and that they are commonly associated with ringforts and monastic enclosures. Second, the purpose of souterrains and the various theories which have been proposed are closely examined and all rejected except for the refuge theory, currently out of fashion in favour of storage. Richard Warner makes out a convincing case for the defensibility of the Irish examples and draws on documentary evidence to support his view that the souterrains were built, along with the ringforts, as defensive structures – the souterrains serving most probably as second-line defence for non-combatants and portable provisions. He also suggests that the puzzlingly uneven distribution of souterrains, both within Ireland and elsewhere in the British Isles, may be partly explained in ethnic terms – a view wholeheartedly endorsed by this reviewer. Some delightful and informative diagrams based on recent work in Ireland enhance this excellent contribution.

The last two chapters bring us up to the present day. Kenneth Hudson's entertaining and informative article reviews the history of mining for coal, metals and stone (slate and limestone were mined as well as quarried) from the early industrial era and the heyday of the West Country tin and copper mines through to the improved conditions and changed status of miners in the 20th century. Not only those interested in industrial archaeology will enjoy this contribution. The final chapter, by the late Barbara Jones, is a delight. It deals briefly with such curiosities as the Grotto at Ascot Place, the shell grotto at Margate, ice-houses and other underground structures of the 18th and 19th centuries. For medieval archaeologists, however, here is one of the most interesting structures in the entire book: the bell-shaped pit cut out of the chalk in the centre of Royston, with its wealth of carvings thought to date from the 13th century. The description given here is based on a recent investigation of the Royston Cave carried out by Sylvia Beamon and published in the *Proceedings of the Cambridge Antiquarian Society* (Vol. 68, 1978), in which she suggests that it may be a copy of the Holy Sepulchre in Jerusalem, and should be attributed to the Knights Templar. No doubt argument will rage about this enigmatic monument for many more years to come.

As the first book to be devoted entirely to underground archaeology, *Subterranean Britain* has much to commend it. The contributions cover most of the main groups of subterranean monuments in Britain, save for those deliberately excluded. All the papers are of interest, and some are of real importance for the specialist in each field. The editor is to be congratulated for bringing together a collection which deserves a wide readership among all those interested in the archaeology of these islands, of whatever period, above or below ground.

P. M. CHRISTIE

BRADLEY, R. *The prehistoric settlement of Britain* (Archaeology of Britain Series). London, Routledge & Kegan Paul, 1978. 155 pp., illus. £7.75.

This book manipulates the factual data contained in Megaw and Simpson's *Introduction to British Prehistory* (1979) with much of the economic and environmental data surely to be found in the forthcoming volume *British Prehistory: the Environment.* It would be a disservice to apply the term 'chapters' to the units into which the text is broken up and 'essays' would be a better description. If

there is a theme it would seem to be that many of the behavioural patterns – 'transhumance and nomadism' and 'hunting and gathering' – encountered during the Pre-Roman Farmer epoch mimic patterns of exploitation established as long ago as the earliest Post-glacial: only perhaps 'tillage and hard labour' were added to the total economic framework. Just when they were added is the subject of perhaps the most detailed and valuable of the essays, that on 'Clearance and Colonisation', where Richard Bradley argues carefully and convincingly that the earliest evidences for what we would all agree are farmer activities are to be found before the elm decline. Indeed he presents a series of cogent arguments as to why the pioneering stage of the 'Neolithic' must have begun at least in southern England by '. . . the earlier fourth millennium BC . . .'. From the 'Mesolithic end' it can be argued that there is no reason why in southern England (at least) this pioneering – or indeed some more stable system of farmer exploitation – could not have become established by the *beginning* of the fourth millennium BC and perhaps even the very end of the fifth millennium. Every radiocarbon determination later than about 4,000 bc which seems to be associated with Mesolithic artefacts is in some way suspect, while typological considerations for south-east and south-west England make ending the development of a microlithic technology before 4,000 bc particularly attractive. If these suppositions are correct then the clearances documented by Bradley from the edges of and within the Lake District, from Northern Ireland, from the North Yorkshire moors and from the sand of Broome Heath in Norfolk, merely mark colonisation of environments marginal in disposition to the loess-rich soils of south-eastern England, which it seems reasonable to speculate would have been the first areas of the island to be selected by incomers from the mainland. Bradley speculates (following Mitchell) that soils will have advertised themselves and their fertility to pioneer farmers through their forest trees, and it seems probable that the tree and shrub communities on the loess soils on this side of the Channel – whatever these were – will have been closely similar to those on the loess-rich soils of Holland, Belgium and northern Germany. Bradley's essay highlights the whole avoided problem of designing a research strategy for investigating the behaviour and chronology of the first generation(s) of farmers in the island, when it is becoming apparent that what we already know so much about are only their descendants who were so to speak 'forced' to take up the 'marginal' areas of poorer soils and mountain edges, where buried soils have been preserved and where contemporary bogs were forming.

I have selected to comment upon one idea in one essay (chapter) since the discussion in that chapter is on a topic so to speak 'dear to the heart'. Each essay builds upon a different aspect of the economic and to a lesser extent the cultural archaeology of the 5,000 years before the Romans and the conclusions and ideas generated by each of these separate studies are linked in a concluding essay 'The Magnitude of Antique Fragments'. The book is worth buying for the concluding essay alone. While individual readers cannot be expected to agree with each argument within what is a personal synthesis of the available data – for example, this reviewer would quarrel with the interpretation placed on the sites of High Rocks and Torbryan – there is so much that is good, most notably the discussion of evidence for a fall in absolute population at about 2,500 years BC, and the discussion of Beakers – again to only select two of the many good points – that I would happily recommend the chapter to anyone seeking an easy way to grasp the basic outline of our island's later prehistory. To do so, however, would do the author of this book an injustice, because it is within the middle essays of this volume that so much that is new is said, that the ideas that are summarised in the concluding essay are developed and explored, and the qualities of Richard Bradley as a thinker and a teacher most clearly exposed.

R. M. JACOBI

COLES, J. *et al. Somerset Levels Papers*, 4 (1978); 5 (1979); 6 (1980). Obtainable from the Department of Archaeology, University of Cambridge. £3 each (inc. p. and p.).

With the early numbers of the *Somerset Levels Papers* a high standard of prompt publication was set and the series was established as essential reading for all with an interest in British prehistory. These three most recent numbers contain reports on major investigations of the Sweet Track (*c.* 3200 bc), the Meare Heath Track (*c.* 1100 bc) and a complex network of trackways on Tinney's Ground dating mainly to the late second millennium BC. There are in addition reports on numerous smaller trackway investigations and the third millennium BC Baker platform which represents an important addition to the range of structures reported from the Levels. The platform is integral to a trackway and seems to have been used as a landing place for boats and a platform for fishing and fowling activities. Weed seeds and beetles suggest that the neighbouring dry ground of Westhay Island was pasture at the time. Continued investigation of the trackways has been amply rewarded both in terms of the wealth of structural detail recorded and the discovery of small but important collections of associated artefactual material including a Bronze Age wooden fork, a possible digging stick of Neolithic date, flints and pottery.

It was continued peat cutting on the Levels which led to the discovery of most of the trackways and necessitated their excavation. Recently, however, it has become apparent that prehistoric remains over a much wider area are threatened in a more insidious way with drying out as the watertable is continually lowered. Prompted by this realisation Miss Orme and Professor Coles have extended the project's temporal range and embarked on an important re-investigation of the Meare Iron Age settlement. This was situated on the raised bog surface separated by a watery lagg from higher ground. Contrary to the view of Avery it is clearly demonstrated that this was a living site and a good case is presented to show that it was seasonally occupied. Certainly many of the multiple clay platforms did not carry huts and the inhabitants seem to have lived in tents; furthermore it is highly probable that the site was flooded in winter.

What makes the Somerset Levels project so important, and a model for future archaeological projects, is the skilful integration of palaeoenvironmental studies. Pollen and macro-vegetation remains enable the structures to be related to the various stages in the development of the Levels, and the work of Dr Beckett and others has led to the definition of a series of regional pollen zones and land-use episodes. Floating tree-ring chronologies by Ruth Morgan allow the felling dates of timber in various lengths of trackway to be compared. Dr Girling's work on the insect faunas demonstrates that those from the Meare Iron Age settlement are very much more varied than those from the earlier trackways, reflecting the wide range of suitable habitats created by intensive human activity in the settlement area. The project continues to make innovations in technique and these papers include reports on microbiological decay traces in wood, improved conservation methods for wooden artefacts, further evidence of Neolithic woodland management and a greater emphasis on macro-plant remains as indicators of local environmental conditions.

Few can deny that this is one aspect of the Department of the Environment's rescue programme where the results have been fully commensurate with the effort – equally good value will be had by purchasers of these papers.

MARTIN BELL

MORRISON, A. *Early man in Britain and Ireland: an introduction to Palaeolithic and Mesolithic cultures.* London, Croom Helm, 1980. 209 pp., illus. £12.95, paperback £7.95.

It is an important event in British archaeology to have a brand new textbook on the Palaeolithic and Mesolithic – particularly to have a volume which is copiously illustrated and written in a style that is easy to read and simple to follow. Combine with this a series of extensive bibliographies and a pair of chapters dealing respectively with the chronology of the Pleistocene and the development of the hominids and you have a most useful text for the study of man in Britain in what is ultimately a world context.

The subject covered is the settlement of Britain from the earliest certain trace of man's presence at Westbury-sub-Mendip up to the earliest Neolithic of Ballynagilly. The archaeology of this possibly half-million-years span of time is dealt with in five chapters – one on the Lower and Middle Palaeolithic, one on the Upper Palaeolithic and three on Alex Morrison's speciality, the archaeology and environment of the Post-glacial. To some this distribution must seem uneven but it highlights the growth areas in British early prehistory in just the same way as the one and a half sides on the Mesolithic to Neolithic transition glosses over one of the least considered problem areas in British archaeology.

I do not want to comment at any length on the earliest sections of this book, those on the Lower and Middle Palaeolithic, since more profound discussion will assuredly be generated by those whose particular speciality these periods are. It does, however, seem strange, given very thought-provoking essays recently attempted by Sutcliffe (for Britain) and Kukla (for Europe) on the number and the timing of the glacials (and more especially the interglacials to be identified on land) to find Alex Morrison still using what might be termed a short chronology (Fig. 39, for instance). Even accepting a 'short chronology' the placement of many of the archaeological occurrences within such a framework seem difficult to justify – such as Kent's Cavern in the Cromerian and Fordwich in the 'Corton interstadial' – the latter only certainly recognised in Britain at Corton. In the case of the archaic-looking handaxes from the B1 breccia at Kent's Cavern it should be stressed that none of these was actually found with an *undisturbed* fauna which included elements interpretable as being Cromerian in age. All that can strictly be inferred about these handaxes is that they are earlier in date than some point at the beginning of the last glaciation, since the cave earth which occurs above the B1 breccia and is separated from it by the C1 crystalline stalagmite contains 'bout coupé' handaxes.

Moving forward in time, it is sad to see our only two pieces of Upper Palaeolithic art continuing to be chronologically and culturally misplaced. The ? masked man from Pin Hole Cave (Creswell) was quite clearly stated by the excavator to have been found with a Gravettian tanged spearhead ('Font Robert Point') similar to those from the Belgian site of Maisières Canal, while as Ann Sieveking has

very properly commented (*Nature*, **283**, 1980: 719) the closest analogy for the horse's head from Robin Hood's Cave is a drawing from a Late-glacial open site at Cepoy in northern France. Whether the Robin Hood's Cave engraving is a genuine British find is a different problem but its closest mainland parallel is Late-glacial, not earlier. Similarly again the base of a double-bevelled ornamented javelin head in mammoth ivory from Pin Hole is mis-attributed to the Earlier Upper Palaeolithic when the excavator again makes it abundantly clear that it was found with a flint-shouldered spearhead of a type not found on the north European plain before about 13,000 bp.

Morrison canvasses a fifteenth millennium bp date for the return of man to Britain after the maximum of the Devensian ice advance, but the reviewer can still see no solid evidence for such an assertion. It is surprising also to see the dates for the burials at Aveline's Hole quoted as seemingly relevant to the chronology of the Late-glacial occupation of Britain, when what are being dated are clearly Mesolithic inhumations. At Aveline's Hole the insertion of burials has 'disturbed' occupation traces, some assuredly of Allerød age and others perhaps even earlier, if one presses the chronology of the mainland analogues of the bilaterally barbed antler spear from this cave. The spear is, *pace* Morrison's drawing (Fig. 4.5, 15), elaborately scored and grooved in typical Magdalenian style, as was long ago pointed out by Garrod.

Two further trivial points: the 'reindeer' cache from Elder Bush Cave is only deer sp. and is more likely to represent a food store than a sacrifice. The bone of giant deer from Messingham has been re-identified as *Bos* sp.

The chapter on the Mesolithic is full of detail and much evidence is usefully discussed and assessed. Certainly these chapters give the most accurate and thoughtful appraisal of this period to have appeared in print for many years, and it is particularly good to see long sections on Scotland and Ireland and a very fair coverage of Wales. Two comments can, however, be offered on the Welsh sites discussed. The first is a plea that the assemblage from Freshwater West (p. 141) be recognised for what it is – that is, as of farmer period age. Secondly the site at the Nab Head was almost certainly used during *both* the early and the later Mesolithic. The early occupants discarded a tool kit similar to that recovered by Br. van Nédervelde at Daylight Rock on Caldey, and with this assemblage may belong the core adzes from this site (Fig. 7.3, 8). The later occupants left a substantial population of narrow-blade microliths and, it may be suspected, the 'bevelled pebbles' (or 'limpet scoops') recovered from the Nab Head (Fig. 7.3, 9). Again there is no guarantee of chronological homogeneity for the Aberystwyth material collected from excavations at two separate points near the present coast and now mixed together.

The illustration of the barbed spearpoint from Glenavon in Banffshire provokes discussion. Lacaille interpreted the spearhead as suggesting 'a spread of a Baltic (i.e. Maglemosian) tradition' into Scotland. The piece looks out of place (Fig. 7.10, 11) illustrated with a group of west Scottish final Mesolithic harpoons and it seems a valid speculation that Lacaille was right and that the spear represents part of the organic equipment of the earlier settlers of Scotland, who are represented at Lussa Wood on Jura by a cooking place and flint bitruncated microliths of trapeze-like outline. These trapezes are certainly similar to microliths from the Star Carr and Flixton (Maglemosian) sites at both of which barbed spear points similar to the Glenavon piece have been found (Fig. 6.7).

The above comments are not intended as criticisms: instead they are remarks from one colleague to another: a south of the border worker to a worker who has directed his researches towards the changing geography and environment of Scotland during the Post-glacial. The concise but carefully considered discussions of the Scottish evidence are such as have been offered by no worker this side of the border, and these are combined by Alex Morrison with an equally penetrating manipulation of the data available from England, Wales and Ireland. In conclusion, this is a most valuable book at a moment when data on the Palaeolithic and Mesolithic are accumulating more rapidly than at any time since the turn of the century, and when more people than ever before are being taught about the early archaeology of our island.

ROGER M. JACOBI

BULMER, M. *An introduction to Roman samian ware.* Reprinted from the *Journal of the Chester Archaeological Society*, **62**, 1979. Chester, Chester Archaeological Society, 1980. 72 pp., 43 figs., 2 pls. £1.25.

As the introduction to this work makes clear, there is a gap in the literature, caused by a lack of a non-technical but detailed handbook on samian ware for amateur and professional archaeologists. Margaret Bulmer has succeeded in filling the gap for us, with a readable and clear synopsis of the current state of knowledge about the pottery itself, its origins, methods of production, distribution, artistic links, and related pottery types. The sections on manufacture and on imitations are particularly useful, with much new information. However, the potential reader should note carefully the sub-title, 'with special reference to collections in Chester and the North West'. This limiting phrase conceals the

main drawback of the work; that this is not a balanced account of the samian ware industry in the Roman world, but is angled specifically towards the type of the pottery that a field archaeologist in northern Britain is likely to come across, i.e. predominantly Central Gaulish products of the 2nd century. The discussion of these types is very good, but there are *lacunae* in the treatment of samian ware from other kiln centres and of other dates, which are described in less detail.

A few more specific points occurred to me as I read through the text:

p. 8. The reference to the coarseness of Antonine and later samian products is a modern value-judgement, rooted in our neo-classical artistic traditions. It is by no means clear that the provincial purchasers of late samian ware had the same opinions.

p. 9. An illustration of the variety of individual types would have been useful. Dr 18, 18/31 and 31 are shown as having problems in their typology, with only a rudimentary illustration in Fig. 2 – a page full of Dr 18s, etc., would have graphically displayed the problems, and served to warn the novice identifier of samian ware of the difficulties to be encountered. This last point is an aspect that Margaret Bulmer plays down. For instance, on p. 15, she says that some kiln products are indistinguishable even by spectrographic analysis, without drawing the obvious inference that there are considerable doubts even amongst established experts of the attribution of individual pieces to particular workshops (and particular forms). Some indication of these difficulties would have been most useful, especially as this is the sort of publication that may encourage archaeologists to investigate the possibilities of identifying samian ware for themselves. In fact, some practical advice on identifying the pottery would have been an invaluable additional section, detailing what has to be done by, or with the help of, a specialist, and what can be done by the excavator or non-specialist.

p. 14. I would go further than Miss Bulmer's suggestion that the potters of La Graufesenque were 'brought up in the native potting traditions'. It is likely, to judge from the names of the later South Gaulish potters and from the evidence of contemporary local fine wares, that the potters were part of a local potting community that deliberately imitated the technique of samian slipping, and experimented with the pottery until successful. The same pattern of local potters deliberately imitating and developing the samian technique can be seen at Lezoux.

p. 17. Is the 'Trajanic gap' more apparent than real? The gap could easily be an artefact of our assumptions about the dating of the pottery rather than a real decline in production. The fixed points for dating all centre around the late 70s and 80s, such as Pompeii, or the Agricolan occupation of Scotland. This may compress the chronology of late South Gaulish wares back towards these dates, thus creating a gap. Recent suggestions of an extended chronology for the 1st century occupation of Scotland (by Hanson in *Roman Frontier Studies,* 1979) may alter the picture to one of later production of South Gaulish ware.

p. 19. The references to East Gaulish ware and its production sites are lacking when compared with those for South and Central Gaul. Where, for instance, are the works by Huld-Zetsche on Trier (including the general review of the industry in *Trierer Zeitschr.* **34,** 1971, 233 ff.), or the many publications by Kellner and colleagues on the important Westerndorf/Pfaffenhofen excavations? For Switzerland, see now *Acta Bernensia* **8,** 1979, and for Spain (p. 22), *Zephyrus* **25,** 1974, 425–8, Roca Roumens, *Sigillata Hispanica producida en Andujar,* Jaen 1976, and Garabito, *Los Alfares Romanos Riojanos,* Madrid, 1978.

p. 20. The list of British sites with La Madeleine ware is idiosyncratic, representing neither the geographical spread of the ware within Britain nor those sites in the north-west that have it.

pp. 20–1. It is disputable that Rheinzabern and Trier were left in control of the British market after the earlier 3rd century. There is a certain amount of evidence to suggest that Central Gaul and the Argonne continued into this period (see my article on this subject in King and Henig (*ed.*), *The Roman West in the Third Century,* Oxford, 1981). Trading conditions appear to have been stable until the 230s–240s, after which production at all centres declined rapidly. Eventually, Trier, Westerndorf and probably the Argonne were the only centres able to maintain production, but distribution was restricted to the local region.

p. 21. Does the low percentage of East Gaulish ware from the fortress at Chester suggest that the military occupation there was diminishing, rather than difficulties in supply? The higher percentage quoted by Margaret Bulmer for the civil settlement may well support this notion.

p. 23. Colchester decorated ware is scarcely known outside of the kiln sites, and does not appear to have had a distribution in any real sense of the word. It is certainly not known in Chester – why is there such a long section on this and other British samian ware sources, considering how minor a contribution they make to an overall picture of the industry?

p. 26. East Gaulish ware (and to a great extent Central Gaulish ware also) is probably not found in South Gaul and the Mediterranean area due to changes in purchasing preferences from the 2nd century onwards, that led to the rise in popularity of different styles (African red-slip, terra sigillata chiara B, etc.).

p. 28. On the preparation of the clay see also A. Winter, *Die Antike Glanztontechnik, Practische Versuche,* Mainz, 1978.

p. 29. The interpretation of GERMANIF as Germanus and son seems very dubious: why not *Germanius fecit*? Also, is it not a ligatured *oi* in LASIMΦDUS, rather than a Greek *phi*, as Miss Bulmer suggests?

pp. 30–1. The existence of illiterate stamps and poor Latin do not of themselves indicate Gaulish nationality!

p. 31. On standardisation see *Archaeometry* **9**, 1966, 76 ff.; **10**, 1967, 35 ff.; **11**, 1969, 159 ff.; **12**, 1970, 189 ff.; *Archäographie* **2**, 1971, 79 ff.

p. 32. A distinction should have been made between the passing of *poinçons* between mould-makers, and the copying of detail from completed bowls on to moulds (*surmoulage*) which results in a poorer, smaller copy. See *Figlina* **1**, 1976, 97 ff.

p. 37. Why are only Dr 37s considered in the section on moulded decoration? Dr 29s are equally important, and they must be represented in some numbers at Chester.

p. 42. It would probably be quite difficult for Margaret Bulmer to substantiate the end-date for the working life of Cinnamus as '*c.* 175 at the latest', since the pottery is found in dated deposits up to the 240s, and since we can only guess at the relationship between the date of breakage (the evidence available) and the date of manufacture (the date suggested).

p. 43. The suggestion of continuity of technique in the Argonne region has recently received backing from Hofmann in *RCRF Acta* **19/20**, 1979, 214 ff.

p. 46. Since the quality of Oswald's drawings is called into question, I think it is only fair to point out the more recent example of erratic draughtmanship in the corpus of non-figurative decorative types from Central Gaul (Rogers, *Gallia Supp* **28**, 1974).

p. 47. Niederbieber is not particularly good as a dated site, for the date of establishment of the fort is not clearly fixed, and, due to the lack of stratigraphic associations, it is by no means certain that the pottery was still in use in *c.* 260, when the fort was abandoned.

p. 47. Surely Chenet and Gaudron (1955) is a better reference for an individual study of Lavoye, since Oswald only considers the decorative schemes?

pp. 47–8. The references for East Gaulish ware and for *surmoulage* appear here, rather than in the sections in which they are first discussed.

The figures would have been better placed in the text near their text references, rather than as interleaving in the bibliography.

ANTHONY KING

WAINWRIGHT, G. J. *Mount Pleasant, Dorset: excavations 1970–1971, incorporating an account of excavations undertaken at Woodhenge in 1970.* London, Society of Antiquaries of London. xiv + 265 pp., 101 figs., 37 pls. £20.

It is always a pleasure to receive the latest in the long and illustrious series of excavation reports and research papers published by the Society of Antiquaries of London. Their generous format with good quality paper and binding is a pleasure to handle and to consult – easy to read in its bold and elegant letter face and durable in the face of repeated use in its substantial cover.

The site at Mount Pleasant was the last in the great series of excavations conducted by Dr G. J. Wainwright on the great henge earthwork enclosures of the Wessex region, its publication completing the trilogy of Durrington Walls (*Soc Ant London Res Rep* **XXIX**, 1971) and Marden (*Antiq J* **CI**, (1971), 177–239) the whole execution of both excavation and publication having been completed within 13 years – a signal achievement. Of the three sites Mount Pleasant is probably the most important in view of the multi-phase complexity of site culminating in the construction by Beaker-using people of a great palisaded enclosure on the hilltop, and in view of the artefactual sequence on the site which has already contributed substantially to a major reappraisal of the development of Beaker pottery in southern Britain (see Case, 1977).

The excavation account of Mount Pleasant leads us through, at an appropriate level of detail, the evolution of the site from earthwork enclosure with a 'Woodhenge' type timber circle complex (*c.* 2000 bc) enclosed within a penannular ditch, through to a stage of refurbishment with the construction of a sarsen 'cove' in the centre of the timber circle as the only detected element of a 'lithicisation' phase. At a date some 300 radiocarbon years after the construction of the timber circles and the main earthwork enclosure ditch but possibly quite shortly after the 'lithicisation' events, a massive palisade of juxtaposed tree trunks averaging 70 cm in diameter is constructed founded upon a palisade trench some 2.5 m in depth. This enormous construction was ultimately destroyed by fire.

Associated with this unique architectural record is a sequence of artefact deposition of equally unique significance. A flanged and decorated flat axe of putatively Irish origin lay within the secondary silts of a secondary extension of the ditch butt in the west entrance of the earthwork enclosure ditch and presumably only very marginally divorced from radiocarbon dates centring at *c.* 1800 bc. Of

course the excellent archaeological and chronological context of this axe is of very great interest and Dr Dennis Britton has set the axe in its European context in an excellent contribution to the report.

Of equal importance is the sequence of the great quantity and variety of Late Neolithic and Early Bronze Age pottery on the site. The pottery is described by Dr I. H. Longworth in his own contribution to the report and is clearly linked to the ditch stratigraphy on the site in a manner which will facilitate any reassessment of this crucial assemblage exhibiting, as it does, nearly continuous ceramic development within one locality, stratigraphically related, over a period of nearly 1,000 radiocarbon years.

The volume also contains an important section on minor excavational work carried out with clear-cut research objectives (the attainment of chronological and environmental information) on the henge enclosure at Woodhenge excavated firstly by Mrs Maude Cunnington in 1926 and published in her Woodhenge Report in 1929.

It is good to see Drs J. G. Evans (with Hilary Jones) and R. Harcourt continuing their assessment of faunal assemblages from these sites and the construction by Dr Evans of an environmental sequence for the Wiltshire and Dorset chalk based upon the amalgamation of the information from all of the sites involved in this project. Dr Harcourt once again perceives the preponderance of pig bone on the site at Mount Pleasant, difficult to assess on a site of such uncertain function, but clearly continuing from 'Grooved Ware' into 'Beaker' using phases.

The generous format of the Mount Pleasant report has, it would seem to the reviewer, occasionally been allowed to spill into positive indulgence. Single-sided pullouts could have been combined back and front in at least two instances to sharply reduce costs in this notoriously costly area, without undue displacement of material within the layout of the text. The publication of some 80 photographs (many of them very beautiful) certainly allows the reader to grasp the 'feel' of the site, but while many of the plates are clearly necessary to elucidate vital areas of interpretation and record, the reviewer feels that of the 80 photographs, some 20 or 30 really only repeat and do not seriously reinforce points made elsewhere in the text or in the figures (Plates XXXa, b, XXXVIb for example). The use of standardised abbreviations, of tabulation and of 'tighter' format could also substantially compress the vital publication of pottery detail in catalogue form – a major component of the volume.

The completion of the publication of this great project places before us a body of information which has yet to be fully assimilated within the pattern of interpreted British prehistory. It may also serve as a timely reminder of the far greater rewards to be derived from the steady perusal of long-term and large-scale projects when we may be tempted to disseminate diminishing funds so that investigations continue at a lower and progressively less informative level.

Reference

Case, H. J. 1977 The beaker culture in Britain and Ireland. In *Beakers in Britain and Europe* (ed. R. J. Mercer). *BAR* Suppl. Series XXVI, 71–101.

ROGER MERCER

WILSON, D. R. and SHERLOCK, D. *North Leigh Roman villa, Oxfordshire* (Department of the Environment Official Handbook). London, HMSO, 1980. 25 pp., illus., 3 plans. 85p.

This booklet is one of the most recent additions to the series of Official Handbooks to Department of the Environment Ancient Monuments. The subject covered is the well-known villa at North Leigh, Oxfordshire, which is often used as a typical example of a Romano-British courtyard villa. Its complete ground-plan is tolerably established, despite uncertainties arising from the early 19th century excavations. Unfortunately, this aspect is really the only important feature about the site; finds are few, or lost, and features *in situ*, such as the mosaics, are of no particular interest (save that in room 1).

As a result of these factors, the authors rightly stress the topography and plan of the villa. A new plan has been drawn up, and the earlier phases have also been extracted for a separate, and very useful, plan of the late 1st and 2nd (and 3rd?) century remains. The core of this early villa was a winged-corridor house, flanked to SW and NE by an agricultural building and a baths respectively. Nothing is particularly unusual about this period of the villa, however, for it was not outstanding in size or layout. It is the developments of the late 3rd and early 4th centuries that capture the interest, for they are the result of an ambitious and elaborate scheme of expansion, that consisted of the addition of two wings at right angles to the original villa, and the closing of the courtyard thus formed by a wall and monumental gateway. The curiosity of the new arrangement is the replication of various features in each wing, principally the bath buildings. This goes unremarked by the two authors of the Handbook, despite a controversial, but attractive, interpretation of such arrangements by J. T. Smith (1978).

The main criticisms that can be made are two; the arrangement of the text, and the level at which it is pitched. The former problem arises out of the arrangement that all the Department of the Environment Handbooks follow, namely that of a history of the site placed separately from the description of the remains. This division works well for standing buildings, or for any monument for which detailed documentary references survive, but it is rather less satisfactory for archaeological remains of the Roman period or earlier. The problem lies in the repetition of parts of the history (i.e. architectural development and chronology, in the case of North Leigh) in the description, and vice versa. A confusing need to make further cross-references between the two sections is the result if the reader is to achieve a coherent understanding of the monument. It would have been more desirable, and economical, to have had a single text based on the architectural development of the villa, incorporating elements of the description, so as to inform the reader as to what actually survives. Surely this would serve the visitor better, and go further in fulfilling the general aim of any guidebook – to reconstruct accurately but imaginatively for the visitor, a picture of the appearance and use of the monument, and its vicissitudes? But perhaps this Handbook is not a guidebook.

This brings me to the second point of criticism. It would seem that, on the whole, the Handbook is aimed at the sort of audience that is used to a dense arrangement of text and the sparing use of illustrations and drawings; in other words, it is a typical academic or antiquarian booklet. As such, it is very useful, and ought to find its way on to the shelves of most students of Roman villas in Britain. However, if this is the sort of readership that the Handbook is really aimed at, why is there a glossary at the back explaining, for instance, the term *caldarium*, or *tessera*? Is this a concession to the general reader, based on the assumption that such a person will simply read the text with the aid of the glossary? If so, I think that this is a serious misjudgement of the potential market for the Handbook: it is much too austere and uninspiring for the casual visitor to the site to be tempted into purchasing it, thus leaving probable sales to those with an active amateur or professional interest in archaeology, people to whom the glossary would be redundant. But, as I said at the end of the last paragraph, perhaps this Handbook is not really a guidebook, at least not one for Mr and Mrs Smith and family on a Sunday afternoon visit.

Leaving these points aside, and resuming the role of an academic reviewer, I think it is fair to say that the Handbook is a thorough and very useful addition to the series, providing Roman archaeologists for the first time with an adequate description of this important site. A bibliography would have made it even more useful.

Reference

Smith, J. T. 1978 Villas as a key to social structure. In *Studies in the Romano-British villa*, (ed. M. Todd), pp. 149–84. Leicester.

ANTHONY KING

LAVILLE, Henri. *Climatologie et chronologie du paléolithique en Périgord* (Etudes Quaternaires 4) Marseille, Université de Provence, 1975. 422 pp., 181 figs., 6 tables. Price not stated, paperback.

This major book represents 12 years careful and tedious work in an area whose importance for the study of the west European Palaeolithic is due partly to its favourable geology. The Jurassic and Upper Cretaceous bedrock limestones have been formed by solution, karstic processes and, more rarely, fluviatile action into rock shelters and caves, many of which contain well-preserved, long and detailed cultural sequences. Dr Laville has studied their sedimentary fill to determine the climatic régimes under which it was deposited.

The principal aims of cave sedimentology are to study the mechanics of sedimentation, the degree to which climatic variation is a contributive factor and the extent to which deductions about past climatic change can be made from the sediments analysed. Theoretically, in temperate latitudes mild, damp climates cause the chemical disaggregation of calcium carbonates in limestones; while cold, dry climates cause the clastic erosion of rock surfaces. The debris thus produced will tend to be angular under cold conditions but in warmer periods weathering processes will produce more rounded clasts; while a cold, humid phase will produce many, smaller clasts. These cryoclastic paradigms have been derived inductively from the analysis of limestone environments, however, their validity has yet to be deductively demonstrated. The inter-relationship of climate and sedimentary facies is not a simple one and caution is needed in the inference of past climatic change from surviving deposits.

The factors affecting the nature of cave sedimentary deposits may vary considerably even between closely adjacent sites, dependent upon such factors as aspect, cave size and type, topographic location, bedrock type, etc. This should militate against simplistic inter-site comparisons. This study comprises 21 sites of which two (l'Eglise and Font de Gaumes) contain endogene deposits; two (le Piage and le Malpas) form open air slope deposits; and the remainder are shelters and caves of varying

dimensions containing exogene deposits. Yet to this variety of sedimentary situations is brought a uniform interpretative and analytical approach utilising a relatively simple series of tests (granulometry, weathering index, quartz grain morphology, calcimetry, pH and X-ray diffraction).

The book is divided, like Gaul, into three parts: introduction and methodology; site by site sedimentological analysis; general discussion, climatostratigraphy and conclusions.

In part II there is a serious dearth of detailed site stratigraphic sections. It is difficult to assess judiciously the validity of the sedimentological analyses without reference to the observed stratigraphy. For some of the sites studied no stratigraphy is published, while for others the published drawing is an inadequate sketch. This reduces the value of the detailed sedimentology analysis diagrams, but some anomalies can be noted. For example, at la Caminade a palaeosol developed during the Wurm III–IV interstadial, yet this is not reflected in the sedimentology. Similarly at le Flageolet II a cultural stratigraphic break of some millennia is sedimentologically invisible. While at le Gare de Couze the sedimentary units cross cut the archaeological sequence. Reference is made at several sites to palynological results which confirm the sedimento-climatological deductions; however, given the great mobility of pollen grains in ground water and the extensive evidence for illuviation in these deposits, these claims should be treated cautiously.

Part III is likely to be of most interest to the archaeologist. The climato-stratigraphic scheme discussed is based on a composite chrono-stratigraphic sequence derived from the major sites with long cultural histories. While the complexity of this climatic scheme parallels stable isotopic research in suggesting continual climatic instability during the Quaternary, the precise framework lacks radiometrically fixed points and the correlations have been, at le Flageolet II, proven false by subsequent radiocarbon dates. Two controversial archaeological problems are also discussed: the Mousterian 'complex' and non-synchronous cultural change. The arguments cannot be commented on in detail but the sites whose climato-sedimentology is used to demonstrate the contemporaneity of all Mousterian variants differ in size, orientation and location, which would affect their sedimentary history. While the comparability of Laugerie Haute (a large shelter) and le Malpas (an open air site) as proof of cultural non-synchroneity can be questioned.

This book represents considerable and long-term effort; the inadequate proof-reading is, therefore, regrettable. Some of the typographical errors are not immediately obvious. It also lacks adequate site location details. These defects detract seriously from what is otherwise an interesting contribution to Quaternary science.

ESMÉE WEBB

PILET, Christian. *La Nécropole de Frénouville: étude d'une population du la fin de III^{e} à la fin du VII^{e} siècle* (French text with English summary) (BAR Int. Ser. 83), 3 vols. Oxford, British Archaeological Reports, 1980. 339 pp., 217 pls. £23.00

This three volume report on a cemetery of the 4th to the 7th centuries AD in Normandy is a minor triumph in BAR publication. Nothing could be better for both French and British archaeology than a series of reports on sites of the first millennium AD spanning both sides of the Channel. Each group of excavators could learn a lot; some aspects of British techniques and interpretation would help the French, and a wider, more European view, would definitely help the British.

Volume three of the set contains all the drawings. The contents of each grave are illustrated together at a scale which is usually 1:1, but, in the case of some iron-work can go down to 1:5; many classes of material such as spears, pots, glass vessels, and grave stones are illustrated a second time as coherent groups; finally all the graves in which something, whether human remains or grave-goods, was found are drawn at the scale of 1:30. This is an excellent record of the cemetery which errs, if anything, on the side of generosity, but there are no sections of graves or other features to complete the record.

Volume two duplicates a certain amount of the information from volume three in words rather than in pictures by giving a complete word picture of each grave and its contents under the headings grave, including dimensions, orientation, bones, but this only includes a statement of what was found with no qualitative information, and a full description of the grave-goods, article by article. The only human information is a single letter by the grave number which indicates a man, a woman, bones of indeterminate sex, or no bones at all. The coins are listed at the end of this volume.

Volume one contains the descriptive and interpretative text in which all classes of finds are examined and made the subject of comment, belt-buckle by cooking pot, by hair-pin, by knife. There are 12 pages of introduction, 16 of summary and discussion about the cemetery and burial rite, and four pages of conclusion. Two essential volumes, one on the analysis of the cemetery, and the other on the human remains have not been published, but I will complain more about this later.

Judging the three volumes as the record of a cemetery excavation is fairly easy; most of the information that anyone interested in the late Roman and Migration periods could want is fully published at least once, and sometimes twice. It would have helped if we could have been given tables of all the features and finds which have been so fully listed and described, so that we could see at a glance the associations of the various finds throughout the cemetery, but perhaps this is just one more aspect of the non-existent analysis. It is quite easy to take issue with some of the judgements such as the 'German-ness' of some 4th century belt buckles which seem to me more British, the tendency of the writer to use the dates of coins in some graves as clear dates for graves, rather than as possible indications, and a failure to use the glass vessels to demonstrate either continuity or discontinuity. Good marks must be given for the awareness of the links with the south of Britain in the matter of belt fittings and especially the recognition of British black burnished pots, though if they are wheel thrown are they from Dorset or elsewhere?

The absence of a volume of analysis is a pity, but it in no way invalidates the report; it is simply something still to be done. As an example of what this volume might contain I could cite a cumulative date for each grave depending on the date of each of its grave-goods, the characteristics of the grave, its position in the cemetery, and its stratigraphic relationships. Virtually all the information necessary is published, but the work still needs doing, and it is far better done by the excavator than someone outside the excavation and publication of the site.

The absence of the report on human remains is a crime. It exists, presumably in publishable form, as a doctoral thesis by Luc Buchet at the University of Caen. Its data and conclusions are often cited in this work, but it is impossible to judge many of the conclusions which are drawn here because the osteological data simply are not available to check. Thus much play is made of the continuity of physical type in the cemetery, and in Normandy at large. But how wide are the comparisons which have been made? How far from Normandy would you have to look to find a contrasting population? And if this has not been established, what price the continuity and 'absence' of newcomers? One thing, for example, which is wrong in the bone study, is the statement that healed fractures show the intervention of a doctor. Please could BAR consider adding the bone report to this otherwise excellent project?

RICHARD REECE

HAMMOND, N. G. L. *Migrations and invasions in Greece and adjacent areas.* Park Ridge, NJ, Noyes Press, 1976. 187 pp., 12 pls. $24.00.

Rarely since the days of Elliot Smith can there have been published a learned book of such utter inconsequence. Learned, since the author is the self-confessed possessor of a working knowledge of Balkan physical geography, archaeology and history. Inconsequential, misleading and fantastic, since the work is based on a methodological premise so simplistic and misguided as to be almost past belief.

The implicit theoretical basis of the work is that it is possible to make a historical interpretation of prehistoric data by the use of historical analogy. Two principles are adduced from this assertion: any historical movement of peoples of whatever kind from whatever motive proves an antecedent movement of peoples in prehistory (psychic continuity or environmental determinism?); the correlative is that all culture change in prehistory is caused by invasions or migrations.

And so the methodological stage is set for as quaint and antediluvian a group of peoples ever to appear in a prehistoric drama: the 'barbotino' stock, the metal-using Early Helladicites, the 'anchor-people', inevitably the Kurgan stock, in four waves, and, climactically, the northern Rakhmanites (? a tribe of property speculators). A grand total of 22 invasions/migrations is listed, beginning as early as the Middle Palaeolithic and closing with the final (Dorian) destruction of an attenuated Mycenean civilisation. In case the reader is impressed, it should be noted that this total is perhaps under par for the course, since 10 invasions were identified in the Neolithic *alone* in Hammond's *History of Macedonia.* Doubtless this oversight can be rectified in the second edition!

The methodological problem is that, in prehistory, the 'historical events' Hammond delights in can never be positively identified since it is impossible (with or without ^{14}C dating) to prove contemporaneity of allegedly simultaneous 'events' on different sites let alone causal relationships. If this is true of relatively well-documented episodes such as the destruction of EHII and III settlements in southern Greece, how much more true is it of earlier periods.

A second fundamental point is that similarity does not necessarily betoken a relationship. This is obvious in many of Hammond's scenarios (e.g. the invasion of Maliq level IIal in Albania by peoples from Slovenia or Austria, on the grounds that both peoples used flat copper axes to build pile-dwellings!), less obvious to the non-specialist in others (viz. the spurious comparison of Starčevo impressed wares with the Pre-Sesklo pottery of Neolithic Thessaly). In this connection, Hammond has

a particular penchant for the ethnic hypothesis that pots can be equated with people. The most extreme example is his attribution of the five different pottery categories at the Albanian Neolithic site of Cakran to five distinct ethnic groups, each of whom was alleged to have made a separate economic contribution to the site's survival. Occasionally, the author's logical positivism in favour of ethnicity is (? deliberately) misleading; when Theocharis states that the Dimini culture of Thessaly has connections with the north-east, not with the south or east, Hammond assumes this means a Kurgan connection (whereas in fact Theocharis meant the opposite – i.e. a Tripolje-Cucuteni connection!). There are moments such as this when the 'working knowledge' wears a trifle thin.

Hammond's use of historical analogy is reminiscent of the reasons why non-selective use of ethnographic analogy has been so heavily criticised by processualists. It seems extraordinary that a historical particularist such as the author can overlook that the invasions and migrations he succinctly describes in the first part of the book have precise, definable and particular causes within the given historical context. The Vlachs settled upland areas because the mountainous zones were unoccupied and the lowland zone populations were large and well organised; that Vlachs remained in the uplands testifies to a successful economic adaptation, not only that uplands provide rich summer pasture.

Since historical invasions and migrations have their particular socio-economic causality, it follows that historical analogies are acceptable only if the same conditions were demonstrably replicated in prehistory. Since demonstrable replication is (almost) impossible, it follows that historical analogy is false; its only use is as a source of hypotheses which can be tested against the appropriate regional evidence within a processualist methodology. Any other use of historical analogy is tantamount to gross environmental determinism (e.g. Hammond's argument that the farmers who brought impressed pottery from the central Balkans to Greece settled in only north and west Thessaly, because it was closest to their richest summer pastures).

The second (prehistoric) part of the book is filled with surprises for the wary, pitfalls for the unwary. Hammond's chronological framework (p. 80) surpasses the ambitions of even the subtlest practitioners of the shortest possible chronology, the more so as it is combined with a high chronology for Kurgan invasions and an exceptionally early date for the start of Balkan farming (the end of the eighth millennium bc – p. 85). The spectre is raised of PPN sites in Greece and the Adriatic (the more surprising in view of the Pottery Mesolithic argument for the latter area). The ease with which the season of occupation is attributed to settlements would cause astonishment in palaeo-economic quarters. The claim that Anzabegovo, in Macedonia, raised more cattle and pig than caprines (p. 89) is flatly contradicted by the published faunal report. What is perhaps most ingenious is the public relations exercise perpetrated by the author on behalf of Professor Gimbutas' own offsprings – the Kurgan peoples. Amongst Kurgan achievements are the construction of the late Neolithic acropolis at Dhimini (p. 105), the invasion of the Peloponnese at the end of EHII and III, the introduction of tumulus burial to the whole Balkan peninsula and, not least, the foundation of Mycenaean civilisation through an overlay of authority and control (p. 162). The recognition of these achievements in itself marks a rare event – the out-Gimbutassing of Professor Gimbutas in the field of Kurgan propaganda. It is a sad commentary on the state of European prehistory that so much time is devoted to an explanation of processes by undocumented historical events.

Such is the nature of this work. Technically excellent and embellished by the elegant use of satellite photographs next to maps, the book is easy to read, although the military background of the author is apparent in occasionally interjected commands. Despite its superficial attractions, this work is a minefield for the uninitiated, a bombshell for the specialist and a regrettably contrived third strike by the author.

JOHN CHAPMAN

DENNELL, R. *Early farming in South Bulgaria from the VI to the III millennium B.C.* (BAR Int. Ser. 45). Oxford, British Archaeological Reports, 1978. 304 pp., 51 figs. £7.50.

With the publication of Robin Dennell's thesis in the BAR Supplementary (now International) Series, another crop from the fertile plot of the British Academy's Early Farming Project is successfully harvested. Whilst the flavour of the product has been improved by certain mutations from the original stock, some less desirable characteristics nevertheless damage its potential yield.

In his study of prehistoric Bulgarian economics, the author pursues one of the principal aims of the Early Farming Project – the investigation of alternative hypotheses to the diffusion of farming from the Near East. In this aim, Dennell is handicapped by the paucity and bias of biological information; it is to his credit that by original fieldwork he expands the data base for south Bulgaria in terms of faunal and botanical analyses.

It is ironic that the theoretical strength of the work – the insights into sampling and the context of plant remains – reveals weaknesses in research design, data collection and interpretation. In a

botanical examplar of Middle-Range Theory, Dennell demonstrates that an understanding of plant remains necessarily follows contextual categorisation of the finds. There are elegant examples of the confusion produced by comparison of like with unlike context at both micro-level (e.g. an oven full of packed grain with a refuse pit with occasional seeds) and macro-level (e.g. samples from inland Neolithic and coastal Bronze Age sites in Thessaly). More positively, the classes of plant remains resulting from different processing activities are clearly outlined, as the basis for controlled sampling of archaeological deposits.

The research design is full of promise: territorial analysis of three contrasting regions in south Bulgaria (Čelopec, Kazanluk, Nova Zagora) with excavation of environmental sondas at key sites in each area. But as the picture unfolds, it becomes clear that the samples collected with such technical precision do not offer sufficient opportunities for the comparison of like with like, the basis of Dennell's theoretical contribution. Whilst the reasons for this stem partly from unpredictable factors (the nature of the excavated sample), there are signs of insufficient co-ordination between specialist and excavator and a lack of appreciation of quantitative sample principles. Whilst mutual comprehension is never easy in such contexts, the value of an agreed and statistically sound sampling policy cannot be over-emphasised.

The net result of this sampling inadequacy is that, whilst interpretation of the results of individual sites is of a high order, inter- and intra-regional comparisons are frustratingly difficult to make. Dennell himself admits by implication (p. 162) that the samples from Early Neolithic Čavdar and Kazanluk, Copper Age Ezero and Kazanluk, and Bronze Age Ezero and Siganski Moghila are not strictly comparable. It is a product of ill luck and sampling strategy that the samples from Early Neolithic Čavdar and Kazanluk, deriving from different contexts, cannot be directly compared; more serious is the lack of comparability between the Early, Middle and Late Neolithic samples on the same site of Kazanluk.

There are therefore legitimate doubts about the validity of statements such as: 'There is no evidence that the economic importance of each cultigen changed in this region from the Neolithic to the Early Bronze Age' (p. 148); with the absence of truly comparable samples, the author cannot be sure that such importance did *not* vary through time. Similarly, it is doubtful whether the evidence supports the conclusion (p. 162) that each of the main cultigens (emmer, barley and legumes) 'was of equal importance'.

This chain of reasoning ends with what is arguably Dennell's most significant finding – the development of a three-course fallow system from the mid-sixth millennium until the Bronze Age. Given the ambiguity of the plant data from Kazanluk and the Nova Zagora regions (pp. 122, 148–9), the botanical case rests on the Čavdar evidence.

Here the presence of three crops each in large homogeneous samples – emmer, barley and vetch – indicated availability of the component species, and the distribution of weeds and commensals in these samples is best explained, it is claimed, by the crop rotation hypothesis. However, the definition of sample homogeneity is not stated. In fact more than half the Type 1 (oven) samples have 10% impurities, with one sample containing as much as 35% of other species. These figures do not indicate markedly efficient cleaning of crops for storage or consumption. Sowing of impure crops remains a viable alternative at Čavdar to the hypothesis of crop rotation.

Botanical support for crop rotation being equivocal, the fall-back position is its necessity for the maintenance of such long occupations. Whilst this point may be of theoretical validity, there is an unproven assumption of *continuous* tell occupation in Bulgaria. Such continuity cannot be tested by radiocarbon dating, a technique regrettably lacking insufficient precision, but can be challenged on stratigraphic grounds (e.g. the sterile level between levels II and III at Tell Karanovo). Since few tells have yet been excavated, the notion of continuous occupation must be treated with caution.

In addition, Dennell's calculations on population and crop production in the Nova Zagora area, which are held to support the crop rotation thesis (pp. 139–41) contain one questionable assumption, namely that uneroded forest soils and smonicas would be too intractable for prehistoric cultivation. In view of the locational, artefactual and zoological evidence for bovine traction and plough agriculture from the beginning of the fourth millennium BC in the Balkans (Chapman, 1981, forthcoming), it is likely that, at least from the Gumelnița period, all forest soils, chernozoems and possibly even smonicas would have been amenable to arable farming. This potential increase in arable yields may be viewed in several ways, only one of which (the Boserup theory of intensification of land use stimulated by population growth) implies a continuing need for crop rotation. The alternative implies a satisficer approach, with crop rotation as but one of several responses to resource conservation (e.g. longer fallowing periods or cyclic agriculture).

It is in the concluding chapter on the regional context for Bulgarian subsistence that Dennell is at his most controversial. The diffusionist hypothesis for the spread of farming from the Near East into Europe is rejected for two main reasons: (1) the availability of domesticable resources in the Aegean late Pleistocene and early Holocene and (2) the absence of contacts between SE Europe and Anatolia at the start of the Neolithic. To quote the Franchthi evidence for wild barley and lentils in

the late Palaeolithic is one thing, but to ignore the abrupt introduction of domestic animals at the start of the Neolithic there simply because it does not fit the continuity model, is unjustifiable. Similarly, the lack of survey data from west Anatolia is overlooked; absence of evidence does not prove its converse. In fact, there are a variety of complex artefact traits found in both the Balkans and central Anatolia (e.g. the Nea Nikomedeia and Late Neolithic Hacilar figurines, the Anza vase and Late Neolithic Hacilar painted wares, fired clay stamp seals, miniature greenstone axes, as well as lip-plugs). These specific identities, quite distinct from other general similarities, indicate stimulus diffusion as the minimal level of contact. This same mechanism surely provided an important impetus towards the development of an ultimately European type of farming, as the culmination of economic intensification in the early Altithermal period.

There are many valuable points of analysis in this stimulating work. The correlation between the length of tell occupation and the extent of arable in the territory of Nova Zagova sites is a helpful example. Similarly, the demonstration of an erosional phase at the end of the Copper Age in the same area elegantly illustrates the potential of land-use studies rather than ethnic explanations in prehistory. Few remarks jar. One is the unsupported assertion that 15 m of the 18-m Djadovo tell is a natural formation, the remnant of a largely eroded plain (p. 134). And nonsense sentences such as 'similar sites such as Vinča and Starčevo are found to the west in Yugoslav Macedonia' (p. 153) clearly eluded both editor and author.

In summary, Robin Dennell is to be congratulated for his enterprise in assembling such valuable primary data in support of a stimulating hypothesis. As a pilot study in palaeo-botanical reconstruction, this work will stand as a tribute to the perspicacity of its author.

JOHN CHAPMAN

PRICE, Martin Jessop (*ed.*). *Coins: an illustrated survey – 650 to the present day*. Published in association with British Museum Publications Ltd. London, Hamlyn–Country Life, 1980. 320 pp., illus. £25.00.

The general editor of this book, Martin Price, and his team of contributors deserve very high praise for putting into such little space an authoritative guide to the main coinage series of the world. The photographs, mainly by Ray Gardner, are always clear, often sparkling, and provide some of the first enlargements without any obvious drawbacks to appear in popular print. The house editor and the designer should be shot.

The coinages are split up into sensible sections chosen more for the changes of coinage than the political changes going on around them; thus the coinages of the Hellenistic kingdoms finish at 170 BC and a section on Rome and the Hellenistic world sets the scene before the Roman Empire and Provinces unfold. Martin Price deals with the first three centuries of coinage simply and effectively, Daphne Nash on the Celts puts each separate coinage in its place and its time, Ian Carradice deals with the Hellenistic world and with the Empire and Provinces, Andrew Burnett interleaves with Rome and the Hellenistic world and Rome from Severus to Diocletian, and John Kent then takes us from the Classical to the medieval world. Once in the middle ages (AD 700) Philip Grierson deals separately with Byzantium and the Christian Levant and Western Christendom, both ending around 1450. Further flung sections deal with coinage after 1450 in Europe and America, the coinage of the Middle East, India, and the Far East, and there is a chapter on paper money.

It would be extremely surprising if the individual contributors, picked with care, had made mistakes in their own sections, or had been allowed by the editor to misjudge the periods and their intersection: little to criticise here. The very short ration of space for each contributor has led to some overcompression, which in turn has led to occasional statements which are unhelpful such as 'the battle of Actium, near Greece' (from Andrew Burnett) or '(Celtic) gold and silver of high purity and heavy weight' (Daphne Nash). John Kent shares in the problem with 'as a consequence of reforms in Treasury procedure the letters OB began to appear on almost all gold coin and the mintage of gold was largely restricted to a special Treasury mint'. In each case there is nothing wrong with the statement, simply that there is not enough surrounding material to know what *near* Greece means, nor what *heavy* should be compared with, nor what OB stands for or why it was introduced.

It is interesting to know, from the several texts that issue from the British Museum, what is in fashion this year; fairly obviously it is Greek Imperials, those coins of the Roman emperors struck with Greek legends in the eastern provinces of the empire. The former division between eastern and western coinages is deplored, and attempts are made to see the issues of any emperor as a whole. This is excellent in theory and the sections of this book make a very good start in practice, but we shall get nowhere fast if the British Museum, who really started the rift by publishing these coins in their Greek Catalogues, don't get down to work and repair the damage with a good, clear, simple, and well illustrated guide to these coins. The people are there, the coins are there, please let it be a high priority.

While Ian Carradice does this, could Andrew Burnett perhaps expand his piece by producing a guide to the early Greek and Roman coinage of Italy?

So much for the pictures by themselves, and the text by itself. To try to use the two together is hopeless, this is the reason for wanting the designer and house editor eliminated. I must assume that originally words and pictures were thought of as two parts of a whole. When reading the Roman sections I did not really need to refer to the pictures, but I did notice that I was very unlucky in never seeing the few coins I did want to inspect on the same page as the text. From Philip Grierson's chapters I was determined to learn a lot, and I then found that it was rare for a coin referred to in the text to be shown on that page. So that this serious objection is based on fact, I can say that in Grierson's Western Christendom there are 18 double spreads, the text mentions 140 coins, 180 coins are illustrated; of those 140 coins mentioned only 24 are illustrated on the same page. Of those 18 double spreads only on four is there any correspondence at all between coins mentioned and shown; on the other 14 there is no connection between words and pictures. This is not design, of which in any case I disapprove, it is simple silliness in which the producers either did not read, or did not understand the book which had been written for them. Their job was basic craftsmanship in getting what the authors wanted into print. They failed.

RICHARD REECE

GAITZSCH, Wolfgang. *Eiserne römische Werkzeuge. Studien zur römischen Werkzeugkunde in Italien und den nördlichen Provinzen des Imperium Romanum,* 2 vols. (BAR Int. Ser. 78). Oxford, British Archaeological Reports, 1980. 410 pp., 74 pls., 43 figs. £15.00.

Despite its title this book is not a study of Roman iron tools in general; it is even more limited than its sub-title might suggest being strictly confined both in the area covered and the types studied. The main tools discussed are those used by the smith, carpenter, mason and leather worker; areas such as agriculture and the home being excluded. The basis of the study is the large, but much neglected collections of material, primarily from Pompeii, in the Museo Nazionale in Naples and the Antiquarium at Pompeii. These are supplemented by smaller groups from Aquileia and a series of German sites – Niederbieber, Vetera, Novaesium and Königsforst; in addition some other published material from Germany, and to a lesser extent Britain and Gaul, is referred to in the discussion. Within these limits it is a useful and thorough study, of particular value for publishing a large group of the Pompeian material for the first time. As a result it largely, but not entirely, replaces Petrie's pioneer study, *Tools and Weapons* (1917), as a convenient source of information on the tools from Pompeii.

Each of the main types is discussed separately, a classification being offered where necessary, with an initial note on the Latin terminology, and references to representations of the tools on coins, reliefs and wall-paintings. These general sections are supplemented by a catalogue of some 300 tools, over half of which come from Pompeii, most being illustrated by simple outline drawings, which are usually adequate, although the almost total absence of cross-sections creates a number of unnecessary ambiguities. There is a short English summary, and a German/English glossary of terms.

Finally, two words of warning to British excavators hoping to use it as a convenient source of comparative material for their own finds. Firstly, there are often considerable differences between the material from southern Italy and Britain, and even superficially similar pieces may in fact be significantly different. Secondly, the German material published here supplements, but in no way replaces the much larger groups in such works as *O.R.L., Saalburg-Jahrbuch,* or L. Jacobi's invaluable *Das Römerkastell Saalburg* (1897).

The production of these volumes is typical of the BAR series, being adequate but unlovely; any sense of design apparently being regarded as an unnecessary frivolity.

W. H. MANNING

PEROCCO, Guido (*ed.*) *The Horses of San Marco, Venice.* English edition translated by Valerie and John Wieton-Ely. London, Thames & Hudson, 1979. viii + 245 pp., 280 illus. £10.00.

In 1204 the infamous Fourth Crusade led and financed by Venice decided a better return on their investment could be made by attacking Christian Constantinople rather than attempting to drive the forces of Islam from the Holy Land. Until then the walls built by Theodosius had proved the insuperable barrier to all invaders, protecting the accumulated treasures of the successors to the Roman Empire.

Perhaps the most spectacular of the spoils removed by the conquering Venetians were the four ancient life-size gilt horses. These were given pride of place on the Loggia above the entrance to St Mark's Cathedral, soon to become almost as symbolic of the city and its glory as the Lion of St Mark

itself; already by the 14th century the Genoese were threatening to 'stable the horses of St Marco'. This however was not achieved until Napoleon signalled the end of the Serene Republic by their removal (in 1797) to form the centrepiece of his own short-lived triumphal monument in Paris. As well as their great symbolism they have always been acknowledged as major works of art and the question of their origins and early history have been greatly and inconclusively debated (nowhere more than in this book). Before 1204 there is no certain documentation, thus stylistic and technical evidence must be used exclusively to date them.

In 1965 growing concern over the deterioration of the bronze in the fume-laden atmosphere of modern Venice led to an exhaustive scientific study of one of the horses. Whilst it was removed from St Mark's the opportunity was taken to display it in Venice, Turin and in London together with other equestrian monuments from classical antiquity in an excellent exhibition supported by Olivetti.

To accompany the exhibition, this collected volume of essays was published first in Italian and then with additions in English. The book is divided into three sections dealing broadly with the history, description and technical aspects of the horses with further chapters on the history and technique spilling over inexplicably into the introduction and appendix respectively.

Part one, the history, starts with a discussion on the development of classical equestrian sculpture and continues with chapters on the history of the horses in Venice up to the present day. The opinions, guesses, theories of the great and less great upon the horses through the ages are recorded. Of these Petrarch probably got closest to the true state of our knowledge then and now describing them as 'the work of some ancient and famous artist unknown to us'.

The second section begins with a description by A. G. Toniato of the exhibited horse which does provide some hard stylistic evidence to suggest a late Roman date. This is followed by a discussion of classical horse breeds by A. Azzavoli. Then comes the photogrammetry and contour planning of the horse, which also re-appears again in greater detail in the appendix without actually seeming to achieve very much. The following sections on the casting and metal composition of the horse are regrettably a puzzling disappointment. First comes the famous 1743 description by Boffrand of the casting of an equestrian statue of Louis XIV in one piece with the detailed illustrations of the complicated systems of feeders and vents together with the descriptions on modelling and casting from Cellini and from modern textbooks. The next section which actually deals with the St Mark's horse says very little except that the casting 'was not carried out in a single cast but in many parts'. This was the standard classical practice to cast sections separately and then to solder or rivet them together.

So first we have a detailed description of how the horses were not cast and then no details of how they were made! All told there are no less than 80 pages devoted to the scientific and technical description yet at the end of it basic information on the number of separate castings each horse was made from, how they were fixed together, if supported by armatures, whether any of the clay core survived inside (which could be used for thermoluminescent dating), how much of the prominent detail such as tail, ears, etc., are solid casting, evidence for chaplets, the extent of restoration and the extent and nature of chasing and engraving is omitted. The metallographic section is confined largely to the effects of corrosion and to a description of the very interesting scoring carried out (apparently) over much of the statue after gilding. Once again after many words and excellent illustrations the extent of this scoring is not given or any clue as to why it was done. The horses are of almost pure copper with a little tin as Klaproth found in 1815 and others have been rediscovering at about 15 year intervals ever since. The composition is discussed in two sections by the same author, one in the description and one in the appendix, in the first he can find no parallel, then exactly 10 pages further on and into the appendix in his second section he quotes the parallel. In both sections though he is unable to offer any explanation for the unusual composition which is especially unfortunate as the section *between* the two, by Oddy, Vlad and Meeks gives the exact technical reasons why the horses are of copper and many of the closely dated parallels that have been discovered in the British Museum by Craddock and in French provincial museums of Picon, Boucher and Condamin, all pointing to a date in the early centuries AD. The work concludes with long blow-by-blow reports on the corrosion of the metal and its conservation, reports duplicated by the various laboratories involved. It takes 33 pages to learn that the horse was suffering from standard bronze corrosion and was treated in the standard way. For the English editions there are additional sections by F. Zevi on the equestrian statue of Nerva from Miseno, by M. Perry on the legends and superstitions of the San Marco trophies, and the original section on gilding by Vlad was rewritten with Oddy and Meeks to incorporate the research performed at the British Museum Research Laboratory.

The volume as a whole suffers badly from all the classic faults of collected chapters by different authors: replication, gaps, omissions and contradictions abound. The authors seem to have worked in isolation and not to have been aware of the ground covered by their fellows. Thus most of the contributors feel compelled to give a history of the horses, and no matter what the title of the chapter it usually swings inexorably to the vexed and obviously fascinating question of their origin. Unfortunately none of the stylistic or history chapters have anything new or even specific to say beyond the details of the eyes and ears given in the description chapter. The only important new evidence comes

from the technical examination of the gilding and the appreciation of why the horses are of copper, not bronze, which shows they were made to be mercury gilt, a process not applied to statuary before the first century AD.

The text is full of minor typing and editing slips – some of the text references to the illustrations are wrong, BC and AD are often confused. Sometimes the mistakes are irresolvable, take for example the statement 'Persian heavy cavalry draws to a close between the fifth and seventh century BC when the Huns brought the bow back in favour. It would not therefore have been the forerunner of the Medieval cavalry which developed between the seventh and tenth century AD'. Now, presumably it should read AD not BC in the first sentence, but that makes nonsense of the following sentence. One has to consult the original Italian version to resolve this, where one finds yet another discrepancy, there, European heavy cavalry started in the 11th and 12th centuries AD.

So does the sum of the contributions justify the whole? The illustrations of the horses and related material are uniformly excellent, and have far more coherence than the texts. One cannot help feeling that several authors were asked for contributions when really they had nothing to say, or someone else was already saying it. If the repetition and the irrelevancies were cut out the text could be reduced by at least half and become consequently much easier to use. What is especially exasperating is that despite the size and format of the volume, the excellent photographs, coupled with the formidable array of experts armed with a battery of techniques – there is still not a complete basic description of the horses, and many important questions are left unanswered. There is however a wealth of material, some of it new and the illustrations alone ensure it will continue to be consulted but the chance was missed here to put together a definitive statement.

At least one, probably all of the horses are coming down from St Mark's again, this time to the sanctuary of the clean atmosphere of a museum; perhaps the material from this volume could be drastically reduced with the gaps plugged to form the monograph the horses of St Mark deserve.

PAUL T. CRADDOCK

TRUMP, David. *The prehistory of the Mediterranean.* London, Allen Lane, 1980. 310 pp., 66 figs., 6 maps, 34 pls. £7.95.

Dr Trump's *The prehistory of the Mediterranean* gives a culture-historical perspective of events around the Mediterranean coasts from the earliest human habitation until the rise of Rome. His stated aim is 'seeing the classical world in its wider perspectives, as the climax of several millennia of development throughout the Mediterranean basin' (p. xi). This is an ambitious goal in a relatively short span of pages, since Dr Trump tries to give balance to developments in the East Mediterranean, especially Egypt and Palestine, as well as the Aegean and the West Mediterranean. The rest of North Africa is given rather shorter treatment, and this emphasises the need for research in the Maghreb and Libya, to catch up with European developments, so that a fuller 'circum-Mediterranean' prehistory may be written in another couple of decades.

Dr Trump's text is clear, and useful simple line drawings are interspersed at frequent intervals. He commences with a brief geographical setting, followed by six chapters of cultural prehistory. The transition from one area to another is achieved efficiently by the use of sub-divisions within chapters, and a map with numbered sites and a key printed on the opposite page, is provided for each chapter. The maps are useful, despite their small scale, but the last one, which supposedly indicates the extent of Greek, Etruscan and Phoenician influence, does not coincide with the text, and the Etruscan line is only present in the key.

The book seems to have been prepared as an introductory text for students and the general public, with 34 good plates, a list of sites and museums, and a chest-of-drawers chronological outline. It tends to mention links rather than account for different life-styles. The influences of environment are rarely touched upon. Societies which do not change are described as 'stagnating' – but may they not have achieved a satisfactory adaptation to their ecological and social environments? In particular, the major weakness of the book for students is the lack of in-text references and the one-page bibliography, which preclude the following-up of some of the major controversies touched upon by Dr Trump.

With these reservations, however, Dr Trump has produced a workmanlike culture history of the Mediterranean area, suitable for introductory classes of prehistory, and of interest to other prehistorians for his combining of developments in the East and West Mediterranean.

PATRICIA PHILLIPS

INSTITUTE OF ARCHAEOLOGY

LEEKLEY, D. and NOYES, R. *Archaeological excavations in Southern Greece.* Park Ridge, NJ, Noyes Press, 1976. x + 150 pp. $15.00.

LEEKLEY, D. and EFSTRATIOU, N. *Archaeological excavations in Central and Northern Greece.* Park Ridge, NJ, Noyes Press, 1980. vii + 184 pp. $15.00.

These two volumes continue a series on excavations in the Aegean initiated with *Archaeological excavations in the Greek islands* by the same publisher in 1975 (reviewed in the 1979 issue of the *Bulletin*) and bring to completion a list of relevant sites within the boundaries of modern Greece. Like their predecessor, they address themselves chiefly to the professional archaeologist and interested scholar wishing to obtain information on the extent of past excavations in a particular region or to get acquainted with the investigation and literature of a specific site, while no doubt managing at the same time to impress the odd browser as a collective testimony of the prodigiousness of archaeological fieldwork in Greece over the last 150 years.

As before, the material presented in each book has been structured as a gazetteer of excavated sites, broken down according to the modern political nomes which make up the regions covered. Thus, the first book under review comprises the eight nomes of Attica and the Peloponnese and the second the nine nomes of the central and northern Greek mainland. This system facilitates quick reference by subdividing the geographical scope of each work and allows sites to be looked up directly by nome or, if the latter is not known, with the help of an Index of Place Names at the end of the volume which also includes names not listed as entries in the gazetteer. A redundant feature of the first book is its lengthy Table of Contents which duplicates the order of entries in the following gazetteer, and sensibly it has been dropped in the second book. The entries themselves again follow the style established by the first volume of the series, providing the years of excavations, the names of the excavators, the chronology, and an abstract of the artefactual evidence of each site, as well as copious references to primary literature that will be regarded by many as the most useful aspect of the books and are essential in making them effective aids in bibliographical research. It is therefore all the more regrettable that the authors have not opted for a simple and consistent system of references such as the Harvard System, adopting instead a cumbersome method of listing books alphabetically by title and frequently cited articles separately by author. Furthermore, references are sometimes repeated in full in the text even though captions or abbreviations are given for them in the bibliography, and in some instances well-known series or journals are spelled out where their abbreviations would have been perfectly clear (e.g. *SIMA* for *Studies in Mediterranean Archaeology* and *JFA* for *Journal of Field Archaeology*); these would be minor slips were it not for the fact that they waste precious space in the entries. The descriptions of the individual excavations, on the other hand, are lucidly written and succeed well in conveying the salient facts, and if their wording occasionally seems almost too economical this is understandable in light of the increased number of sites accommodated in each volume (341 and 400 respectively). A welcome feature of both is the continuing emphasis on minor excavations and their literature, information on which would otherwise be hard to come by.

On balance, the two books repeat the excellent if not quite impeccable format and standard of the first volume of the series. More thought could have been expended with little additional effort on a number of details such as those noted above, yet the worst that can be said about these works is that their encyclopedic dryness will make them the kind of books everybody uses and nobody ever quotes, at least not on their own merit. With their publication there is now a complete corpus of excavated sites in all of Greece dating from the Paleolithic to the Roman period with a wealth of bibliographical data up to the late 1970s, assembled and presented in an authoritative and coherent fashion that renders the value of the entire series greater than the sum of its parts, especially once it is supplemented by a volume of urgently needed maps which the authors have promised for the future. Well written, handsomely typeset and bound like all books from this press and reasonably priced, the two latest volumes will certainly bring relief to those weary of time-consuming library research and may even appeal to the jaded bibliophile.

STEVE HELD

STANLEY PRICE, N. P. *Early prehistoric settlement in Cyprus, 6500–3000 B.C.* (BAR Int. Ser. 65). Oxford, British Archaeological Reports, 1979. xiv + 174 pp., 20 text figs., 16 tables, 1 foldout map. £5.50.

Many doctoral dissertations hone specialisation to such a fine edge that once they are published they fail to cut into all but the most delicate mental tissue of readers who are well versed in their authors' fields of interest. Yet while it must be conceded that the successful blending of maximum scholarly depth and accuracy with wit and anecdotal salt of a Colin Renfrew or Kent Flannery is not

everyone's gift, credit goes to British Archaeological Reports for providing us with a steadily growing series of *edited* and often even partly rewritten and updated theses which on the whole are a good deal more palatable than the products of University Microfilms.

It is salutary, therefore, that the present volume not only conforms to the customary standard of the series but also covers fairly wide ground, and in importance transcends its geographical scope by dealing with a number of aspects of neolithic and chalcolithic settlement in Cyprus that make it interesting to Near Eastern prehistory at large. However, there are more substantial reasons for greeting its publication with some excitement. Based on the author's Ph.D. thesis (Oxford, 1976), it is the first monographic study of the early prehistoric culture of the island to appear in almost 18 years, i.e. since Dikaios' synoptic contribution to the reports of the Swedish Cyprus Expedition (*SCE*, IV. 1A: 1–204, Lund, 1962). Moreover, Stanley Price is the most theoretically outspoken member of a new generation of prehistoric archaeologists working in the island since the late 1960s, and the present work strongly reflects their problem-oriented approach to fieldwork and data analysis, as well as a long-overdue interest in archaeological systematics and processual paradigms that has led to important re-evaluations of the traditional culture sequence of early prehistoric Cyprus and which has recently been expressed at greater length by the same author ('On terminology and models in Cypriote prehistory', in *Studies presented in memory of Porphyrios Dikaios,* Nicosia, Lions Club, Cosmopolitan, 1979, pp. 1–11).

The work consists of two parts of roughly equal length yet very different nature, which renders the whole enterprise somewhat less coherent than would have been desirable: a theoretical part dealing with various issues related to early prehistoric settlement, and a comprehensive gazetteer of sites based on surveys conducted by the author in 1971–2 and 1977–8 and by staff members of the Department of Antiquities of Cyprus intermittently since approximately 1930. The theoretical section comprises four chapters, and although their topics are broadly interrelated it is fortunate that the reference to settlement patterns in the title of the original thesis has been omitted, for only one of them is devoted to locational analysis (Chapter 4). Chapter 1 provides a brief and straight-forward discussion of the environmental background and thereby establishes the ecological parameters required for the subsequent considerations of site selection and sample bias in site survey. Special reference is made to evidence on the Early Holocene environment of Cyprus, a subject as fundamentally important to the study of the prehistoric period as it has been prone to speculation in the past, and although paleo-environmental data admittedly are still scarce, there is sufficient material for a more detailed and critical evaluation than the condensation offered here, particularly where soil distribution and climax vegetation zones are concerned. A subject which does not suffer from a lack of data is the mechanisms and extent of erosion, and since it bears directly upon the determination of the difference between sampled and target populations of sites discussed in Chapter 3 it would certainly have profited from a closer examination. Chapter 2, the longest of the book, begins with a brief review of the absolute chronology of the period concerned (based almost exclusively on C-14 dates for various sites) and then deals with a specific problem pertaining to both relative chronology and the dating of sites on the basis of surface collections and/or limited samples from trial excavations; namely, pottery seriation. Since widespread use continues to be made of a ceramic classification which was established over 20 years ago and has long been in need of revision and refinement in light of recent evidence from different parts of the island (especially the south-west), this discussion is of far greater significance than can be conveyed by a short review. Essentially, the points it raises are the accuracy of Dikaios' ceramic typology if used for the purpose of seriation and factors affecting the reliability of occurrence and frequency seriations of excavated and surface-collected assemblages, examples of which are the potential mis-attribution of sherds to real wares or to bogus wares like 'Plain White' that leads to a distortion of raw counts, and the degrees of intra-site variation and ceramic regionalism. The text is supplemented by a number of figures and tables illustrating major points and summarising the statistical information, and although it represents a balanced and well-rounded treatment of the subject the non-specialist reader is advised to consider it in conjunction with other relevant papers (e.g. Kromholz in Todd, *RDAC,* 1979: 35–9; Peltenburg in *Stud Pres Mem Porph Dikaios,* pp. 21–45; Stewart, *RDAC,* 1978: 8–19).

After this *excursus* into the realm of pottery, the author turns his attention to site distribution in Chapter 3, which was enlarged for the present volume. It is mainly an assessment of the sample as represented by the site catalogue in the second part, and the latter should consequently be judged within the constraints of the conclusions reached in it. Factors affecting the preservation, discovery, and correct identification of early prehistoric sites are discussed and synthesised in a four-step process of selective elimination of the original evidence, and a useful overview is provided of the intensity and extent of systematic and unsystematic site surveys in Cyprus over the past 50 years. Chapter 4, which was rewritten from its original version, explores various possible determinants of regional and inter-regional settlement patterns, ranging from geographical and economic factors to less easily articulated varaibles such as prehistoric population changes and catastrophic events, and modern data relating to rural economy, land use, and demography are repeatedly drawn on in order to put certain points into perspective or even to suggest analogies.

By contrast, the Gazetteer of Sites in the second part of the work provides not so much food for thought as its essential ingredients, and anyone working on pre-Bronze Age Cyprus will find it indispensable as an informative and accurate quick-reference guide to sites ranging in size from published settlements to previously unreported findspots. Each of the 313 entries (grouped according to the six modern administrative districts) lists altitude, map references, original report, excavations (where applicable), published references, absolute dating (where feasible), description and location of the material, and the author's own observations on site topography, extent, and state of preservation. The gazetteer is supplemented by a distribution map which, although regrettably making no distinction between neolithic and chalcolithic sites, is extremely valuable as the first complete map to be published since 1967 (cf. Nicolaou, *Kypriakai Spoudhai*, 31: 37–52).

Altogether, the only major weakness of the work is the fact that its length does little justice to its own importance. Particularly Chapter 4, which all previous chapters lead up to, rambles through too many pivotal subjects and far-reaching conclusions without expanding on them, and since negligent research and sloppy thinking have never been the marks of Stanley Price's writing one suspects that some analyses included in the original thesis have been sacrificed to editorial considerations, as is hinted in the Introduction. Here, for once, more specialisation would have clarified rather than obscured matters. Also, an analysis of internal settlement structure published elsewhere (*Levant*, 11, 1979: 46–83) might have been included for the sake of completeness. Despite these criticisms, however, the theoretical chapters are provocative and compulsory reading for anyone interested in Cypriot prehistory, whereas the gazetteer combines with Catling's catalogue of Bronze Age sites (*Op Ath*, IV, 1963: 146–69) to form an invaluable inventory of sites from the start of the aceramic Neolithic to the end of the Late Bronze Age.

STEVE HELD

DE LUMLEY, Henry. *La Grotte de L'Hortus* (Valflaunès, Hérault). Les chasseurs néandertaliens et leur milieu de vie. Elaboration d'une chronologie du Würmien II dans le Midi mediterranean (Mémoire No. 1 Etudes Quaternaires, Géologie, Paléontologie, Préhistoire). Marseille, Laboratoire de Paléontologie Humaine et de Préhistoire, Université de Provence-Centre Saint-Charles, 1972. 668 pp., illus.

Between the years 1960 and 1964 Henry de Lumley directed the excavation of the cave site of L'Hortus situated in the commune of Valflaunès, Hérault. The results of this study have now been published in a volume which encompasses an exhaustive examination of the cave's predominantly Typical Mousterian deposits. Attempts have been made not only to relate the lithic assemblages to the analysis of the deposits but also to comment upon the life and nature of its various inhabitants.

This sizeable work is generally well organised. The table of contents has been combined with the summary so an abstract for each of the 49 articles, contributed by M. de Lumley and 35 collaborators, follows every title: this proved very useful for quick reference. The line-drawings, illustrations and photographs are clear and well produced with the exception of the facsimile pages from an excavation notebook that are barely legible. Of special note are the artist's impressions of the flora and fauna of the massif of L'Hortus during Würm I and II, and occupation scenes during Würm II by M. Eric Guerrier (these should prove particularly beneficial to readers not familiar with this region of France). Also of note is the re-establishment of the highly effective 'old' style line-drawings of bone employed by C. Mourer-Chauviré in her article on bird bones.

The various aspects of the excavation are comprehensively covered in this volume: they include a description of previous excavations, the location and setting of the site and the methods of study. The geomorphology and topography of the region are followed by a very complete and fully illustrated description of the stratigraphy covering the main Würm I and II deposits and the fourth and fifth century level of occupation. The sedimentological report, by J.-C. Miskovsky, describing the differences between the nature of the main deposits is followed by articles on fossilised bone and radiocarbon dating. A very thorough analysis of the fauna (mammals, insects, birds, amphibians, fish) and microfauna as well as reports on the pollen analysis and studies of carbonised wood remains are also provided.

The changes in climate detected in the beds of L'Hortus are described by H. de Lumley, E. Guerrier and A. Fournier. A comparative section follows that relates the changes noted in climate at Combe-Grenal to those at L'Hortus with particular attention being paid to the five main cold phases. The result is the conclusion that the climate was more severe and continental in the south-west than in the south-east which showed definite Mediterranean influence. Climatic descriptions continue in the next short article on the fourth and fifth century deposits.

The classic Neanderthal human remains are very capably described by M.-A. de Lumley. The 20 individuals discovered at L'Hortus were found to have died between 15 and 30 years of age. The robust features that excluded this group from progress toward modern man are fully portrayed.

The lithic industry of the Mousterian deposits are stated to have been homogeneous from the base to the top of the deposit. It is found to be typical Mousterian of Levallois facies and is compared to other similar and possibly related sites in the south-east of France. The tools, all of which are illustrated at two-thirds natural size, are well presented and uncrowded on the page. Unfortunately the text is highly over-crowded with tables and charts making it very difficult to follow the character of the assemblages, although it must be admitted that vast quantities of raw data are provided. The half-page conclusions for this 98 page description state that the industries that are compared to L'Hortus are all part of the L'Hortus complex and that a definite scheme of evolution can be established.

The homogeneity of the lithic industries on the site is demonstrated by N. Rolland in the article on the archaeometric study of the lithic assemblages. Frequency tables of the variables are presented to illustrate the selection tendency in the use of large specimens for regular utilisation and to show comparative properties to other sites. Unfortunately once again a surfeit of analysed data mars the results.

The types of material selected and utilised is further described in the following two papers. Minor aspects of the site such as the mesolithic flint, prehistoric pottery and utilisation of the cave by animals in later years complete the volume with the exception of a major article on use of the cave as a hunting camp. Conclusions regarding the site are summarised and finds plotted in relation to their relevant layers, with the results of the separate articles joining to form a picture that places L'Hortus in relation to the other Mousterian sites of the south-east of France.

This volume demonstrates what can be accomplished with a research team when attentions are focused on one site. However, the impressive nature of this method of application can be questioned in respect to the actual contribution the analysis of L'Hortus has made to the understanding of the Mousterian of Würm I and II. Could the results have been obtained by simpler means and would it perhaps have been preferable to focus these worthy people's attentions on other larger sites?

SHEILA COULSON

PHILLIPS, P. *The prehistory of Europe*. London, Allen Lane, 1980. 314 pp., 69 figs., 19 pls. £7.95.
MILISAUSKAS, S. *European prehistory* (Studies in Archaeology). New York and London, Academic Press, 1978. xii + 333 pp., illus. £11.70.

Both books deal with Europe from the earliest appearance of people on the continent to the formation of the Roman Empire. The greater part of Milisauskas's text is ascribed to later European prehistory (Neolithic, Bronze and Iron Ages). A brief introduction is followed by 10 pages on modern European topography and climate and a 26-page section on the 'Pre-agricultural Background'. Phillips divides her text more evenly. Her introduction is longer and includes sections on 'Culture' and 'Dating'. The similar and all-embracing titles of both books could be misleading. Milisauskas emphasises that a large part of his data comes from Central and Eastern Europe. There is little reference to work carried out in Iberia, France, Britain or Scandinavia. Phillips specifically limits her analysis to new information and theories that have emerged in the decade 1968–78.

Milisauskas sets out his intentions as being able to make available to English speaking students 'some outstanding archaeological research that has been carried out in Europe', to integrate this within an anthropological framework and to consider questions of culture change and progress. He provides a valuable addition to the available mostly non-English literature on the Central and Eastern European Neolithic. The anthropological framework sees pre-agricultural socieites as band societies, most Neolithic societies as tribes while some Bronze and Iron Age societies achieve chiefdom and for the former statehood. It provides a simple way of collating the evidence although both the archaeological record and the ethnographic analogies used do not always provide such discrete or exclusive divisions. Milisauskas subdivides his chapters into sections on subsistence strategies, settlement, social and political organisation, trade and ideology. The reconstruction of some of these sections must necessarily be incomplete or speculative due to the limitations of the archaeological material. Milisauskas keeps descriptions of artefacts to a minimum but there are some clear photographs of artefacts. There are numerous informative line drawings of site plans and reconstructions and distribution maps. Both photographs and line drawings are well integrated with the text. This is effectively supplemented by tables notably presenting plant and animal remains from individual sites. Few of the tables, however, are fully explained and this impedes critical analyses of them.

Phillips highlights some of the major discoveries and interpretations of the last decade. To some extent the format becomes a series of abstracts of the appropriate books and articles and their assessment is chosen to be kept minimal. The reproduction of line drawings from different sources has understandably resulted in a variety and absence of scales. Comparable flint artefacts on Fig. 6 receive various scales. Homo and Australopithecus skulls (Fig. 4) have a scale but not European Neanderthal

skulls (Fig. 14). The beads and figurines of Figs. 23 and 31 are life size, while stelae from Sion, Switzerland (Fig. 52), are described as 'great' and similarly lack a scale as do some grid plans of sites (Fig. 25). The plates are placed together central in the text and include good excavation photographs.

Both authors are at their best when dealing with their own period or area specialities. Both authors' personal experience with the Neolithic is evident. The discussion of human evolution in Milisauskas omits important European specimens such as Petralona, Steinheim, Swanscombe and Arago. For the Early Neolithic neither author clarifies Lepenski Vir which is a major site for the understanding of Mesolithic–Neolithic relationships in the Balkans. Milisauskas's ascription of the first hunter-fisher Lepenski Vir to farmers is unexplained. For the later Lepenski Vir which the excavator ascribes to the Early Neolithic Starcevo group (and Phillips to Koros) Phillips notes the economy as 'fishing and only three-quarters of the animal bones were from domestic species'. Hunting and fishing were in fact increased during this period at Lepenski Vir. The domesticates allowed a change from seasonal to permanent occupation but throughout the site is optimally exploiting an ecological niche appropriate to hunting and fishing both contemporary with the first farmers in the area as Nandris has noted. For the early Copper Age the significant rich grave finds from Varna are mentioned in neither text. Relative chronology versus absolute, a recent methodological theme for the Iron Age lacks discussion in both texts. For the proto-historic Iron Age with some specific dated events derived from classical references the chronology provided by rapidly changing fashion ornaments can provide a finer chronology than C-14 dates. Phillips in her reference to Hodson's work at the La Tène cemetery of Munsingen could have highlighted this aspect of the analysis.

Undoubtedly the literature on prehistoric Europe lacked a general work which incorporated recent developments. Both Phillips and Milisauskas have provided topical and useful additions, rather than replacements, to standard synthesis texts such as Childe's *Dawn of European civilisation*, Clark's *World prehistory* and Piggott's *Ancient Europe*. Milisauskas's text is much welcomed for providing detailed information in English on the Central and Eastern European Neolithic in particular and all taken from an interesting anthropological viewpoint which contributes added dimension to the interpretative framework of former syntheses. Phillips provides a valuable index of and reference to recent articles dispersed between numerous journals and is an especial useful locator to the student who has not been able to continuously watch the new accessions shelves over the last decade.

SUE HAMILTON

ALLEN, D. *The coins of the ancient Celts.* Edited by Daphne Nash. Edinburgh University Press, 1980. xi + 265 pp., 29 figs., 41 pls., 18 maps. £12.00.

This work is based on Allen's Rhind Lectures delivered in Edinburgh in 1964. It was Allen's intention to incorporate the content of these lectures in a much needed book dealing with continental Celtic coinages but his untimely death in 1975 prevented him from completing the task. Fortunately, Daphne Nash agreed to act as Editor and prepare the existing material for publication. In doing so she attempts to alter as little as possible of Allen's work whilst taking into account advances made in the subject since 1964.

The first chapter, entitled 'Prolegomena to the study of Celtic Coinage', provides, apart from the title, a brief and easily understood account of the nature of Celtic coinage on the Continent and in Britain. The latter parts of the chapter discuss the metrology, denomination, legend and design of the coins. The subsequent chapters expand on the content of the first, providing greater detail and illustrating the text with reference to the collection of nearly 600 photographs of coin types. The second chapter examines the silver coinages prevalent in the southern Celtic areas, the third dealing with the gold coinages found further north. The coinages of Spain and Narbonensis are given a separate, rather brief chapter, whilst the subsidiary silver and bronze coinages of Gaul and Britain are given a fuller and more detailed treatment. The final two chapters examine, in turn, the legends and the designs employed on Celtic coinages.

The 150 pages of text are well written, the frequent use of sub-headings making it easy to digest. It is amply illustrated by a series of good maps and diagrams though a table of figures would also have been helpful. The text is supplemented by an impressive 38-page 'Select Bibliography of Celtic Numismatics' which will, no doubt, prove invaluable to the student as will the comprehensive series of plates. However, certain of these, such as coin no. 559 on plate 37, are rather less than informative due to a combination of bad photography and lack of detail on the original.

Any criticism, however, must be minimal. The book constitutes an excellent introduction to Celtic coinage that will not be bettered for many years.

S. D. TROW

HIGGINS, Reginald. *The Aegina treasure: an archaeological mystery.* London, Colonnade Books–British Museum Publications, 1979. 72 pp., 65 illus. £3.95 paperback.

Archaeological mysteries are of two kinds: either they are concerned with problems in our understanding of an ancient culture or they imply lack of certainty over the stratification or provenance of artefacts recovered in recent times. While the first type is the sort of challenge that will properly always be part and parcel of archaeology, the second would not exist if human nature was not naturally acquisitive. If the Aegina treasure had been declared to the appropriate authorities when it was found in the late 19th century, the scholarly world would not have been misled as to its origin . . . but then it would now have been in Athens and not in London and we could not have been delighted by Dr Higgins's splendid detective work. Besides even Arthur Evans saw nothing wrong in the British Museum's acquisition in 1892 of the material, manifestly smuggled out of Greece.

In 1957, the author was able to demonstrate that the Aegina treasure was of Middle Minoan date and that some of the pendants had especial affinities with such goldwork as had survived severe looting in the 1880s at the communal tomb of Chrysolakkos, Mallia. He repeats his arguments here and I think there can be little doubt that he is right. However, his thesis that the treasure may have been found in north Crete, perhaps in Chrysolakkos itself (and taken by sponge fishermen to Aegina, there to be 'revealed' to the world) while an intelligent theory, repeated as recently as 1978 in Sinclair Hood's, *The arts in prehistoric Greece* (p. 195) is simply wrong: New investigations by Dr Higgins have now shown that the Aegina treasure almost certainly comes from a Mycenaean tomb on Windmill Hill, north of the town of Aegina and east of Cape Kolonna. However, it was probably not in a burial as such but a 'parcel' of a Dark Age tomb robber's loot taken from an earlier Minoan grave on the island.

One mystery has been dispelled, but a larger and more interesting one is now placed before us. The beauty of the gold jewellery, the gemstones and the gold cup must lead archaeologists to consider the nature of Cretan settlement in Aegina and other islands. Kamares ware and imitations have been found at Kolonna, as well as a short 'Linear A' inscription. Even more intriguing is the possible Minoan affinities of the goddess Aphaia, whose marvellous Classical temple is of course the most famous monument on the island.

As we might have expected from this great jewellery historian, there is an excellent account of Aegean goldsmithing techniques and a useful little catalogue of the treasure.

MARTIN HENIG

BRULET, Raymond. *La fortification de Hauterecenne à Furfooz* (Publications d'Histoire de l'Art et d'Archéologie de l'Université Catholique de Louvain 13). Louvain-le Neuve, Institut Supérieur d'Archéologie et d'Histoire de l'Art, 1978. 101 pp., 58 figs., 1 plan. 300 B.frs.

In putting together this work of just 100 pages Raymond Brulet has performed a great service to archaeology well outside his native Belgium. As an archaeological report there are four sections, a series of plans, some sherds of stratified pottery, a few stratified coins, some pieces of glass, bronze and ironwork. How does such a modest report which attempts to bring together the information from excavations spread over at least 100 years qualify for great praise? The answer lies in the bath-house.

The actual name of the site, Hauterecenne, will convey little; to say that this is the site near Furfooz from which some of the most hotly debated late Roman or early medieval burials were excavated just over 100 years ago will mean a lot to anyone concerned with late Roman cemeteries, Germanic mercenaries in the Roman army, the Germanic invasions of Gaul in the 5th century, and the whole transition from Roman to Merovingian Europe. The discussion which these 20 or so burials has generated is enormous and here at last we have a simple but detailed discussion of the site on a naturally fortified promontory to which the burials belong. The answer to the fame of the site lies in the bath-house because it is in the ruins of the bath-house, which Brulet convincingly ties to the first phase of the fortifications built at the end of the 3rd century, that the soldiers of the late 4th century are buried, arms and all.

By putting together information from all the excavations, previously unpublished, and his own campaigns of 1974–6, he is able convincingly to demonstrate that there are two main phases of Roman occupation. The first is highly orthodox Roman defensive work of the late 3rd century, and the garrison use the bath-house. The second phase is much rougher work of fortification, and the garrison bury their dead in a scarcely ruined bath-house, not surprisingly, in un-Roman, even Germanic, fashion. Cutting all cautionary corners it is possible to say that we can now compare the Romans and the Laeti, or Germanic 'extras'. In between is a period of desertion from perhaps 355 to 380 convincingly demonstrated with beautiful economy by coin histograms. For this reviewer what could possibly be better?

RICHARD REECE

CARSON, R. A. G. *Principal coins of the Romans,* Vol. 2. *The Principate, 31 BC–AD 296.* London, British Museum Publications, 1980. 167 pp., 1149 figs. £25.00.

I have been through this book carefully and derived a great deal of benefit from it. To my students following the course in Roman coinage it will be an essential source book and, I suspect, something approaching a bible. The particular strengths of this second volume in a trilogy which will cover the whole of the Roman coinage lie in the systematic approach to the metals, mints, and denominations of each reign, and the calm and authoritative handling of the 'chaos' of the 3rd century. It must be several years before the work which Robert Carson has done in reducing the vagaries of 3rd century minting can be published in detail in forthcoming volumes of the British Museum Catalogues so that this glimpse of the work, supported by the occasional note and full photograph, is all the more welcome. His short notes on many of the coins illustrated allow the reader to reconstruct for himself the methods by which the mints of the later 3rd century have been tracked down, and the chain of reasoning by which they are separated and named. All this appears for the first time in this volume.

So it is clear that I admire the book; that said, its imperfections ought to be discussed. There is little point in differing over *which* coins should be listed as *the* principal coins of the Romans. The selection was made some time ago, and the coins sit in special cabinets which form an excellent introduction to the Roman coinage, from which students of the Institute have already benefited on their visits to the coin room. But I did miss the one Roman coin, of Hadrian, which has an absolute date in years from the founding of the city, and I did miss any indication of successive portrait styles such as those of Hadrian and Septimius Severus, on which so much of art history rightly or wrongly depends. The space for notes on each coin is of course limited, and again there is little point in complaining about information which has been omitted. But since the Trajanic denarius (no. 538) is listed as a restored or re-issued coin it would be helpful to the student to be given the reference to the Republican denarius it copies, the type of no. 485 could have been compared to the design of Augustus, especially since a nearby coin of Vespasian, no. 484, is compared to a coin of the Republic, and the arrival of the titles Pius and Felix on the coinage of Caracalla might have been noted as the first of many examples in the 3rd and 4th centuries.

For a book which is likely to become a bible of numismatics there are a number of misprints both in words and pictures. The title of 'heir designate' given to Gordian III (no. 775) seems to me redundant, on no. 819 the coinages relate to several deified emperors so that it should be Emperors' rather than Emperor's, and on no. 1068 Numerian must surely have been appointed Augustus to make sense of the AVGGG. In pictures, the modius in no. 398 which is actually described as having three legs is shown upside down, and in nos 912 and 913 the negatives must have been reversed so that we get mirror images.

Finally, and with genuine reluctance, comment must be made on the quality of some of the photographs. No. 806 in bronze and 975 in gold are excellent, for they overcome the particular difficulties which the surfaces of different metals pose. No. 410 in gold is simply a bad photograph because the glare of the light on the bright metal has not been corrected, 1081 is obviously a coin with good relief and a good surface but the angle of lighting has not been suitably adjusted, and 1089 and 1090 are lacking in contrast and clarity. In general left facing busts come out better than right facing busts and the general impression is one of production line photography in which a standard process has been set up so that coins have only been given individual treatment if they deviate significantly from the norm.

The standard formula with which to end such a review is to say that such minor criticisms must not be allowed to detract from the very real qualities of the book. This would be insincere for my minor quibbles concerning the text *do* not detract from a brilliant summary of the coinage of the Roman principate. I simply wish that quality of the photographs matched that of the text, and the process of getting a manuscript into production had matched the sensitivity, clarity and authority of the author.

RICHARD REECE

COTTON, M. A. *The Late Republican villa at Posto, Francolise; Report of an excavation by the Institute of Fine Arts, New York University and the British School at Rome* (Supplementary Publication of the British School at Rome). London, British School at Rome, 1979. xii + 240 pp., 69 figs., 18 pls. £11.50.

This is the first final report of one of the two Italian villas excavated by the Institute of Fine Arts (New York University) and the British School at Rome, between 1962 and 1965, under the direction of Dr Cotton. As such, it represents one of the very few fully published villa excavations in Italy

(cf. also for example, the reports on the villas at Russi and Joannis,[1] both in northern Italy). It is a pity, however, that we have had to wait so long for the report, and thus there are understandable absences amongst the published specialist sections, particularly concerning 'environmental' studies. In addition, the author was unable to take into account the spate of recent interest in villa and landscape studies: an omission which will be remedied with the publication of the second, larger, villa dug by Cotton at San Rocco, less than a kilometre away from Posto.

The site is a small villa in Campania which during the early Empire covered an area of about 2,500 square metres. The actual farmhouse was considerably smaller and unpretentious, covering some 400 square metres. Its maximum extent was thus about a quarter that of the villa at Settefinestre[2] and of a totally different nature, possessing none of the architectural refinements typical of so many large Italian villas. Presumably it belonged to a small resident family living just above subsistence level, although by the second half of the 1st century AD the inhabitants were able to provide the site with a small bath-house. The villa appears to have been abandoned sometime in the second half of the 2nd century AD, when its *fundus* may have been annexed to another estate. By the mid-4th century activity seems to have been resumed on the site. There is little evidence for the physical state of the villa by the 4th century, though it is possible that the structure was not allowed to deteriorate seriously during the time that it was not occupied. Two walls were erected during the period of re-occupation (Period IV), and the press seems at least to have been kept clean. Other, undescribed, features appear on Figs 10 and 13. These traces of work, together with the not inconsiderable amount of late Roman pottery, suggest that 'squatter inhabitants' in the literal sense may here be a misleading term, and that the occupants may have had some form of tenure. Cotton makes the point (p. 57) that 'the fact that it was worth going to the trouble to build a new terrace wall suggests continued farming activities'. Indeed, our knowledge of northern Campanian towns, together with recent field-survey[3] does suggest continued rural activity into the 5th century, usually centred on old villas, despite the 528,402 *iugera* of *agri deserti* (*Cod. Theod.* 11, 28, 2) in late Roman Campania. Hopefully, further excavation and field survey will allow a more precise understanding of this later rural activity.

Eight late inhumation burials were found around the outer walls of the villa complex. One probable infant burial had an associated late Roman jug; otherwise no good dating evidence was found and it is suggested by Cotton that the burials relate to her period IV. There would appear to be two classes of burials generally found associated with villa sites: (1) those belonging to the proprietors and *familia* living and/or working on the site and its land; and (2) those belonging to an alien group that has selected the site as the focus for ritual attention. To the latter class may belong the burials discovered at the sites of Cassana, Gabina 10 and Settefinestre,[4] although Small suggests that the attraction of deserted villa sites for burial was that it thus avoided having to occupy agriculturally exploitable land.[5] Perhaps the careful positioning of the Posto burials alongside the outermost walls of the villa indicate that it was still being inhabited (or even frequented seasonally by a community engaged in transhumance), therefore relegating the burials to class 1.

The largest, and perhaps the most useful, section of the book is Chapter VI, devoted to a detailed account of the pottery. This is a very welcome addition to the few publications dealing with Roman pottery in Italy, particularly for the coarse wares. It is suggested that the villa was constructed in the period from the end of the 2nd century to about 80 BC. However, the numerous closed forms in Black-Glazed Ware, the Gnathian and Apulian red-figure fragments and various other pieces would, in the reviewer's mind, suggest activity on or in close proximity to the site from at least, the end of the 3rd or early 2nd centuries BC. It is refreshing to see the Black-Glazed fabrics described and not, as is so often the case, forced into Lamboglia's original A, B, C classification. None the less, as with the arretine, the material emphasises the need for petrological or trace-element studies[6] if we hope ever to be able to provenance it. The notorious case of Cn. Ateius should dispel faith in attempts to assign pottery to production areas on stamps alone. The few sherds of Eastern sigillata B contrast quite remarkably with that found at the nearby villa of Corigliano[7] where, in a large late Augustan rubbish dump, the proportion of ESB to arretine was in the region of 1 : 1!

Perhaps the least satisfactory section of the pottery report is that on the amphorae, where it would have been interesting to see some form of quantitative table. Points worthy of note are: (a) Falernian wine is never mentioned on stamps (p. 141), although it does occasionally appear in *tituli picti*. Our main evidence for the importance of Falernian production is textual.[8] (b) 'The deep almost vertical lip' of form Dressel 1B is not 'characteristic of the mid-1st century BC' (p. 141). The form appears to have continued, at least, into Augustan times. (c) The amphora form Dressel 2–4 (p. 142) was certainly produced in Campania and Latium, but also in Etruria, Apulia/Calabria, southern France, north-east Spain, southern Spain and other areas (including Britain!). The characteristic bifid handle is also found on the original form from Cos (and on the Tripolitanian form Schone-Mau XXXV) which, the reviewer believes, can be identified by its distinctive fabric and nuances of typology. Therefore, without careful examination, one cannot be sure that all the Dressel 2–4/5s from Posto are of Italian origin; indeed, Fig. 41, no. 6, looks and sounds distinctly Tarraconensian. (d) Fig. 41, no. 3, is not a developed form Dressel 1. Rather, it is a Dressel 1A, probably of later 2nd to mid-1st

century BC date. (e) The amphora illustrated in Fig. 42, nos. 16–17, appear to be north African 'Punic' types.

A notable absence amongst the amphora series is the Baetican Dressel 20 oil amphora. There are a few known from Pompeii, but they do not really appear in quantity in Campania. Perhaps this is due to the strength of local oil production.

The coarse pottery and local fine wares are of great interest. They reveal a large range of inclusions, amongst which are pyroxenes, sanidine feldspars, limestone and mica (with which the reviewer identifies the 'golden specks of quartzite' cited on p. 148). The local pottery is present up to the abandonment of the site in the mid-5th century AD, with a hiatus around the 3rd century. Much of this pottery may have been supplied by kiln sites in the *ager Falernus*, sited along a road from present-day Cascano to Casanova di Carinola. That area appears to have been the centre of a flourishing pottery industry under the Empire, producing amphorae of form Dressel 2–4 and various fine and coarse wares amongst which were 'imitations' of North African types published by Hayes.[9] Products of the Falernian ceramic industry might be Fig. 47, nos. 1–2 (imitation Hayes 197) and many of the vessels in Cotton's series 'bowls with rouletted decoration', 'Late Roman hard red coarse ware' and 'late colour-coated ware'.

Once again, one can only lament the lack of faunal and floral reports, which might have aided study of the site's economic basis, as well as reports on the human remains and tiles. Nevertheless, the reviewer's observations are offered to demonstrate the importance of this welcome report from the pen of one who has contributed so much to the study of Roman Italy. One looks forward more than ever to the complementary report on San Rocco.

[1] Russi: *Not Scavi*, 1977. Joannis: M. J. Strazzulla Rusconi, 'Scavo di una villa rustica a Joannis (Udine), *Aquileia Nostra*, L, 1979: 1–119.

[2] A Carandini and S. Settis, *Schiavi e Padroni nell'Etruria Romana*. Bari, 1979.

[3] Being conducted by the reviewer and students of the Università di Napoli. Cf. W. Johannowsky, 'Problemi Archeologici Campani', *Rend Acc Arch Lett e Belle Arti*, L, 1975: 3–38.

[4] Cassana: G. Mansuelli *et al.*, *La Villa Romana di Cassana*. Ferrara, 1978. Gabina 10: W. Widrig in K. Painter (Ed.), *Roman villas in Italy* (BM Occ. Paper no. 24), 119–40. London, 1980. Sette-finestre: forthcoming.

[5] A. M. Small, review of J. Percival, *The Roman villa* in *JRS*, LXIX, 1979: 210–12.

[6] Cf. D. F. Williams, 'Petrological analysis of arretine and early Samian: a preliminary report'. In P. Arthur and G. Marsh (eds), *Early fine wares in Roman Britain*, 5–13. Oxford, 1978.

[7] In course of excavation by the reviewer for the Soprintendenza Archeologica delle Provincie di Napoli e Caserta.

[8] Cf. the references in V. A. Sirago, *L'Italia Agraria sotto Traiano*, 225–226, Louvain, 1958, and in A. Tchernia, 'Quelques remarques sur le commerce du vin et les amphores', in *Memoirs of the American Academy in Rome*, XXXVI, 1980: 307–10.

[9] J. W. Hayes, *Late Roman pottery*. London, 1972.

PAUL ARTHUR

GALLIOU, P. and SANQUER, R.-H. *La sigillée décorée provenant de Kérilien-en Plounéventer (Finistère)* (Supplement à 'Archéologie en Bretagne' 1). Brest, 'Archéologie en Bretagne', 1979. 66 pp., illus. Fr. 20.

Antiquitées Africaines, **13**, 1979. Paris, CNRS, 1979. 247 pp., illus. Fr. 220.

The first volume reviewed here is devoted to the decorated samian ware from the town of Vorganium in the territory of the Osismii (Finistère); 221 pieces are described, from one public and four private collections, using the standard reference works. All are illustrated by very bad drawings without scales. Some pieces could have been more exhaustively examined, and there are worrying discrepancies in the description of apparently identical sherds (A8–B7, A10–B8, B9–C13; have some of these been inadvertently looked at twice? – their shapes are suspiciously similar). The stamps are slightly better illustrated, and the Hartley die numbers are given where possible. Although not all the known pieces are published here (see footnotes 16 and 17 for references to others), it seems reasonable to suggest that the assemblage is fairly representative of samian use and disposal on the site. This is a matter discussed by Patrick Galliou in the final section, and he shows that there is little evidence for use of the pottery before the later 1st century, from which time the proportion gradually increases, reaching a peak in the late 2nd century. All the pottery comes from South or Central Gaul; there is none from the Argonne or East Gaul. The most remarkable aspect of the collection is the disparity between the percentage of stamps of the 1st century (19%), when compared with the percentage of decorated sherds of the same period (1.35%). This is in contrast to the picture available from sites in

other areas – is it due to a systematic bias in sample collection, or is it a product of an Armorican purchasing preference, that disdained the earlier decorated ware? The latter is the explanation put forward by Galliou, since other assemblages in Brittany display the same characteristic. If this is the right interpretation, and it is certainly very attractive, we have now to establish why it should be so. Is it due to a rejection of the decorated bowls, rooted in a distaste for Romanised art styles, or is it more of an economic phenomenon, due to the price of decorated ware? Further work on the samian assemblages from Brittany may give us the answer. As far as the 2nd century is concerned, the vast majority of the collections is attributable to the period 150–195. It is probable that some of these pieces can be moved later, into the first quarter of the 3rd century, to judge from dated deposits from elsewhere in Europe. This, in fact, would tend to correspond with the apparent period of prosperity in Brittany at this time, documented by Galliou in this and other articles.

Turning to the second volume, in which only two of the articles, forming the bulk of the volume, are relevant in the context of this review, it is clear that we are dealing with a publication of a very different standard. In the two articles, by R. Guéry on provincial potters' stamps from Algeria (p. 23 ff.) and by F. Laubenheimer on Gaulish stamps in Rabat Museum, Morocco (p. 99 ff.), special type has been made up to facilitate the presentation of the readings of the stamps, and there are macro-photographs or drawings of all the extant specimens. Guéry says (p. 25) that this has been done to allow for reinterpretations of the readings, if necessary. Although I do not intend to say anything about the readings, leaving that task to the experts at Leeds, I can only praise the clear and objective presentation of the material, which could serve as a model for the publication of samian ware detail, both stamps and moulded decoration. In addition, the stamps are related to profiles of the vessels where possible; a most useful aid to the identification of unstamped plainware fragments.

The interest of the African articles for the British reader is the light they shed upon the commercial links of La Graufesenque and associated potteries, and they clearly demonstrate the dominant position of this kiln centre in trade in samian ware in the western Mediterranean, outside of Italy itself. Guéry also suggests that the lack of Spanish samian ware in Algeria and places further east probably means that the importation of South Gaulish ware was direct, and not via Spain. However, there are large quantities of South Gaulish ware in Spain itself: if this pottery was markedly cheaper than that of Spain, it would have been possible to use Spanish or Moroccan ports as *entrepôts* and still undercut Spanish prices. A relative lack of Spanish ware need only imply uncompetitive management of distribution of that pottery, not direct and virtually exclusive links between Gaul and North Africa. As to the chronology of the stamps, both collections show the characteristic sharp peak in the 70s noted from so many other sites (as G. Marsh has shown in the Graham Webster *Festschrift*), but inevitably this raises questions – are the stamp histograms representative of the quantity of vessels imported, and, is there a sound basis for the chronology? This review is no place to attempt answers to such questions.

ANTHONY KING

GORGES, J. P. *Les villae hispano-romaines; inventaire et problematique archeologique* (Publications du Centre Pierre, Paris (ERA 522) nr. 4). Paris, Editions de Diffusion Boccard, 1979. 529 pp., 70 pls., 22 figs. Fr 320.

As implied in the title, this book falls into two clearly defined sections which deal with problegamata in the study of Roman villas in Spain, and an inventory of published sites (with selected plans). Aiming to establish a common chronology, history and distribution of villae within the three provinces of Hispania, the author has divided the first section of the book into three parts – historical development, implantation in space and the rural habitat. The remaining part is a catalogue of some 602 sites, with short description, summary chronology and bibliography.

'Inventaire archeologique' this obviously is, and the catalogue provides a great service in collating a vast amount of disparate evidence in one place. But as to welding this body of information together, and properly understanding it, the author has fallen wide of the mark. Less 'problematique archeologique' than 'problematique d'intente'! In setting out to answer nearly every social and economic problem associated with villae, he has ended up by answering none at all. One is left with the impression that he has been unable to selectively use the information at his disposal. Consequently it is a hard book to review, and the neglect to pursue any argument in depth is at times frustrating; within the short space of some 139 pages we dash through the historical development in all three provinces, climatic considerations, soil analysis, regional concentrations, property ownership, establishment of a villa typology, etc. These do not present any really unpardonable blunders so much as many little mistakes, omissions and points of difference that cause one's faith in the narrative to diminish as it proceeds. This review only aims to highlight a couple of aspects, and to underline the difficulties it presents as a 'problematique archeologique' to one who is at present researching in Spain, and likewise studying rural settlement.

Gorges is rightly careful in his application of the term 'villa' to the centre of an agricultural exploitation (p. 12), or similarly, an ensemble of buildings enclosed within a *Fundus* (p. 109). To this end, he whittles down the number of his possible sites from 1,000 to 602. However, given the poor knowledge we possess for most published sites, this cannot be a critical selection. Some valid sites are omitted (viz. Montagut/Massaragals at Malgrat-Arenys de Mar, Provincia de Barcelona; also the famous site of Corsá in the Baix Empordá, Provincia de Girona), and other invalid ones included (thus San Miguel at Barcelona; Gorges' site B.15; Granollers–Gorges' site B.52; these two 'villae' are in fact sites within the walled colonia of *Barcino* and the small town of *Semproniana* respectively).

One can only ever understand the relative importance of a site (and it being merited the title 'villa') in relation to the distribution of surrounding sites and the proximity of market towns, and administrative centres. As Carandini has recently remarked (in the context of Late Republican Etruria), a proper villa should be the *dominant exception* to its immediate neighbourhood. In the case of Hispania, while rural settlement on the Roman pattern (that is, the development of substantial sites in response to the foundation of Roman towns, and displacement of Iberic Oppida) was comparatively late (late 2nd century BC/late 1st century BC in coastal Tarraconensis; in Baetica from the early to mid 1st century AD), this is something perhaps applicable to the late 2nd century/early 3rd century AD onwards, a period which saw the growth of the large centralised estates which dominated the provincial landscape in the Late Empire.

With both these provisos in mind, Gorges' discussion about regional concentrations is meaningless. The only way that trends of rural development can be properly interpreted is through co-ordinated field survey; in this respect, Ponsich's study of rural implantation on the Lower Guadalcuivir still remains the only work of substance. Nevertheless, the plotting of all known evidence for Roman activity within a given area provides a good basis for this, and at the same time substantially alters the picture of some of the areas studied by Gorges. He speaks about the dense rural settlement of the Maresma in Catalonia (p. 88, Fig. 15) and claims that it has the highest population in the area. However, work by the reviewer on rural settlement in this area has elucidated a total of some 1,000 sites in Catalonia (mostly published) as opposed to 126. As the majority of these lie within the Valles and Panades – heart of the Laietanian wine production industry in the 1st century AD – any bias towards the Maresme is eliminated. It is even more misleading to use the numbers of 'early' villae (which mean, in most cases, unexcavated sites that have Arretine or South Gaulish ware among the surface pottery scatter), as evidence for small holdings (or 'Minifundisme' pp. 94 ff.). More often than not, these high numbers of sites reflect the intensity of fieldwork in a given area. Since Catalonia has had a long tradition of that, one should use caution when comparing these figures to those in Andalucia or Lerida.

It is also with some surprise that one finds that the author has neglected to study the vital interdependent relationship between villa and town. In whatever sense one speaks of villae, there can be no doubt that they represent a system for the exploitation of agricultural resources by the municipal aristocracy (or their lessees), and served their urban interests.

Finally, it is a disappointment that we do not benefit from the chronological conclusions of the study. This is partially the result of setting out to establish a 'common chronology', and at once denying Hispania the archaeological and historical variations implicit in its great geographical regionality. It is also through not having digested all the available details, and imposing a chronology on the evidence – and not vice versa. A common chronology we have always had, albeit of elusive origin (viz. the works by Messrs Tarradell, Blazquez and Balil). To this reviewer at least, it has resulted in the rather depressing situation, that whatever villa is excavated in Spain, always goes to prove the same old points (and always pivots around the 3rd century AD invasions). Once one starts to study a restricted area, the common chronology dissolves, and the flickers of a regional chronology are discovered. One feels that a more considered study of the evidence, area by area, and published in a second volume, might have provided a more stimulating historical background.

Hence this emerges as a failed opportunity. Great value is to be found in the meticulously researched catalogue, and the bibliography is equally valuable. But as a study of the villa as economic and social phenomenon, it has succeeded in detaching villae from their spatial background, failed to illustrate the shifting role of towns and villae, and let slip the opportunity of attempting an alternative chronology.

SIMON KEAY

KING, C. E. (*ed.*) *Imperial revenue, expenditure and monetary policy in the fourth century A.D. The fifth Oxford symposium on coinage and monetary history* (BAR Int. Ser. 76). Oxford, British Archaeological Reports, 1980. viii + 278 pp. £10.00.

Once again, in the volume under review, BAR bring to a wide public the deliberations of a small group of people who gathered together in Oxford to discuss a specialist subject in detail: the symposium

had the benefits which accrue from a small gathering, but the academic world at large gets the published benefits. The volume contains seven papers from six experts; all the contributions are on the monetary and economic history of the 4th century AD, but the contributors are fairly strongly divided in their subject matter and their approach to the subject. Whittaker on inflation, Bowman on Egypt, Millar on the *Privata,* and King on the *Sacra Largitiones,* are all firmly based in texts, and take the subject very seriously, and with differing degrees of originality. Roger Tomlin is based on a source which no one should take seriously, the *Historia Augusta,* and appropriately he brings the volume to an end with a sparkling, not to say slightly fizzy, tribute to the best forger of numismatic terms yet known. Jean Pierre Callu, who contributes two papers, one on copper coinage from 348 to 392, and a second on silver hoards and issues from 324 to 392, is completely out on a limb bravely trying to bring the actual evidence, the coins, to bear on all the texts and ideas. In spite of careful planning and hard attempts at synthesis the verdict must be that the facts, the texts, and the ideas stay firmly apart and refused to be synthesised.

Whittaker on inflation in the 4th century writes explicitly as an ancient historian and as such he brings some very bracing and common-sense ideas to the fore. Occasionally he puts forward as rather revolutionary ideas matters which numismatists have taken for granted for some time – an example would be the token nature of the silvered bronze coinage for most of the 4th century – but there is no harm in having numismatic preconceptions taken out and dusted by a well-qualified commentator. Millar and King deal with two branches of the State Money Machine by means of textual snippets which are useful compilations, but, not surprisingly, do not fit together as readable narrative sources. King labours under the extra, and acknowledged, problem that much of her compilation has already been done in John Kent's London Ph.D. thesis on the Office of Count of the Sacred Largess.

Apart from Roger Tomlin and his mine of numismatic misnomers and downright frauds, the only person to attempt a reconciliation of fact and fiction, coins and texts, is Callu, and since he has taken on, at one go, all but the gold coinage for most of the 4th century covering both hoards and site-finds from the Atlantic to Arabia it would obviously be untrue to claim that he has solved all problems. But at least he knows the problems of his material, the difficulties of estimating the size of coin issues, the bias of coins from hoards, and, given time and opportunity his approach offers some hope for the resolution of some of the economic and monetary problems of the later Empire. I feel his isolation in this volume very keenly and greatly regret that he has to steam ahead on his own course with little help from elsewhere. It is instructive to compare these two papers with his excellent work on money and politics in the 3rd century; what has happened in the time between the two publications is that he has burdened himself not only with the study of hoards, but also of site-finds which made little appearance in the 3rd century work. The differences between hoards and site-finds has automatically meant that the picture has become more complex as two conflicting types of evidence have to be welded together. My feelings on reading these two papers are that we are just about at the darkest part of the tunnel (if that is not too dismal and critical a metaphor) but that glimmers of light are showing which way to go.

I am thankful that there is in Paris a friendly and broad-minded Professor of Latin who must spend most of his spare time thinking about coins that have been found throughout the Empire, I am delighted to go on feeding him with British and other information, and I continue to look forward to his offprints with ever-increasing footnotes, but I dread the day when he decides that he understands the circulation of coinage in the Later Roman Empire and puts it all into a book because that will probably take a whole year to review, and need a whole issue of the *Bulletin* to print it in.

RICHARD REECE

KRASKOVSKÁ, L. *Roman bronze vessels from Slovakia.* Translated from the Slovak by Hans Schuck (British Archaeological Reports, Int. Suppl. Series 44). Oxford, BAR, 1978. vi + 81 pp., 14 figs., 19 pls., 1 map. £2.00.

Although there are Roman forts in south-western Slovakia and Rusovce (near Bratislava) was actually within the province of Pannonia most of the finds discussed in this volume were discovered on native sites, particularly cemeteries. Essentially they are objects employed in the drinking of wine, jugs, dippers, strainers and bowls: Like the Roman bronze and silver vessels from early 1st-century graves in Britain (for instance at Welwyn) they testify to the influence of Mediterranean culture beyond the Imperial frontiers. In the case of Slovakia, there was no Roman conquest and Iron-Age society continued to satisfy its needs by importing luxuries, at first from Italy (Capua is suggested as a major centre of manufacture) via Aquileia in the 'amber route' though later, in the 2nd century, there are several items from the Rhineland as well.

No comparable survey of the richer material from Britain has been published since 1968[1] and L'udmila Kraskovská's monograph must be warmly welcomed, not least as an incentive. However, I

have a number of serious reservations. The study reads as though it has been cobbled together from various excavation reports. It is far too deferential, and never strikes out on an independent line of its own. Eastern Europe is comparatively little known to Roman archaeologists in this country, so that does not destroy its value as a work of record but it makes for turgid reading which is not helped by an indifferent translation.

The plates could have been made to appear more attractive if some of the original photographs had been larger and better: There is some extremely poor cutting around them, with the result that each vessel is surrounded by a sort of shadowy *nimbus*. Nothing excuses the way in which some objects are made to terminate abruptly in the middle of the page (e.g. Plate VII, 2 and 3; Plate XVII, 3), and I cried out with frustration at not being able to see more clearly the lovely jug from Zohor (p. 15, Plate XIV) or the splendid tripod with bowl from Stráže (p. 20, Plate XVIII)! The drawing of the figures is a little better though in detail (compare head on Plate VII, 3 and Fig. 3, 2) not as accurate as it might have been.

It is a great pity that the author does not seem to have been aware of M. H. P. Boesterd's work on the bronze vessels in the Rijksmuseum, G. M. Kam, Nijmegen, published in 1956, which is a model in terms of presentation both of illustrations and text.

It seems to have become a kind of ritual to blame BAR. As the reviewer is an occasional writer and editor of their volumes, this does not seem to him to be *quite* fair. But much of the work which with a 'normal' publisher would be done by a sub-editor has to be done by authors unskilled in these matters. Unless the artwork is good to start with, the end result will be shoddy. However, I feel sure that the faults in this volume will be remedied in future offerings from Bratislava both on the Roman Iron Age and on other periods.

[1] H. J. Eggers, Römische Bronzegefässe in Britannien, *Jahrbuch RGZM* 13, 1966, 67–164; also as works of art in J. M. C. Toynbee, *Art in Britain under the Romans*, 1964, 317–27.

MARTIN HENIG

LEDAY, Alain. *La Campagne à l'époque romaine dans le Centre de la Gaule: villes,* vici *et sanctuaires dans la cité des Biturigues Cubi = Roman settlement in Central Gaul in the Roman period: towns,* vici *and sanctuaries in the* civitas *of the* Bithurigues Cubi (BAR Int. Ser. 73). Oxford, British Archaeological Reports, 1980. 435 pp., 88 pls. £15.00

In this volume M. Leday presents some of the results of his recent work in Berry, the *civitas* of the *Bituriges Cubi* in central France. The work is in the tradition of French field archaeology which has also recently been demonstrated by M. Agashe. This tradition uses aerial photography in conjunction with excavation, place names and inscriptions to investigate the Gallo-Roman landscape. This presentation and use of air photographs is a great strength of French archaeology which has much to teach us on this side of the Channel.

M. Leday presents his study in three main parts concerned with the villas, *vici*, and sanctuaries. Each of these is self contained and the three are accompanied by an impressive set of plans which illustrate the sites discussed. The rest contains a wealth of detail and succeeds in bringing it together into a readable text. My only major criticism is that the average reader is unlikely to be very familiar with Berry, and therefore more detailed and larger maps would be welcome.

The main conclusion to be drawn is that this part of Gaul was a predominantly rural area with rich agriculture supporting a large rural population. This population lived in both villas (which are as varied and impressive as the others that we have been shown from France recently) as well as in *vici* (the British 'small towns') which do seem to have been agriculturally based centres. The discussion of the problems of these is particularly valuable to those considering similar sites in this country and elsewhere in the Empire. The total impression given is of a vital and richly textured Gallo-Roman culture. In Leday's own words: 'the *interpretatio gallica* of the Roman civilisation is balanced by the *interpretatio romana* of the underlying Celtic civilisation, and the two end by being indistinguishable . . .' Not really so different from Roman Britain.

M. Leday is to be congratulated for this work, and BAR are to be thanked for presenting us with an English translation.

MARTIN MILLETT

WALLBANK, F. W. *The awful revolution: the decline of the Roman Empire in the West.* Liverpool, Liverpool University Press, 1969. Reprinted 1978. 139 pp., illus. £5.00 paperback.

This is a firmly moral and liberal book on the decline of the Roman Empire in the West by an ancient historian who, I think, would not be ashamed to admit that his heart lies in Republican Rome.

To those who share his emotional centre of gravity the book will appear clear, bold, entertaining and scholarly; to those who question the tenets of morality and liberalism in the modern world, and who prefer the Later Empire to the earlier Roman story the book must be a reactionary indulgence in literary quotation. It may be objected that such subjective and emotional reviewing is un-academic. Such objection holds no weight when, as in this case, the substance of the book under review is its subjective and cultural approach to an ancient event.

There is a second line of attack which is amply justified by Wallbank's claim that it is possible to say something new about the subject because the discoveries of archaeology have 'opened up new vistas for the historian of social and economic life' (p. 17). Material derived from archaeology is then to form a significant part of the case. Simple but important slips in the archaeological information are therefore worrying. The case of samian pottery in Pompei is attributed to 'central' Gaul on p. 29, which immediately raises a question of how far the author has understood the spread of the pottery industry which forms one of his illustrations of trade and economics elsewhere. The statement that the army of *c.* AD 300 'now received virtually nothing beyond their rations, uniform and arms' (p. 68) must make us wonder what has happened to the donatives in gold which in fact formed the stabilising factor of the later Roman army. Against such major points the dates for the mint of London of 296–324 (p. 84), which ignore the coins of Carausius and Allectus (286–96) form a mere quibble.

One positive aspect of the book which can justly be commended is the author's willingness to look back into the high years of the Empire for the origin of some of the troubles which grew in the 4th and 5th centuries to major proportions. But perhaps this is only commending him for being a firmly Republican historian sharing in Gibbon's implicit judgement that the history of the Roman Empire consists solely, from its inception, of first Decline, then Fall.

RICHARD REECE

LAFAURIE, Jean. *Mélanges du numismatique, d'archéologie et d'histoire offerts à Jean Lafaurie.* Edités par P. Bastien, E. Dumas, H. Huvelin and C. Morrisson. Paris, Société Française de Numismatique, 1980. 286 pp., 28 pls. Fr.300.

In times of financial stringency Mélanges, or Essays in honour of . . ., may appear to librarians as items which could be done without. Periodicals have to be kept up or there will be gaps in the series, books are usually on one subject which is either wanted or not wanted, Mélanges tend to spread themselves so that one or two essays of relevance cannot justify buying the whole book. This set of essays in honour of the distinguished Parisian numismatist Jean Lafaurie must dash all librarians' hopes for it sticks firmly, with very few exceptions, to the history and archaeology of the Roman world from AD 200 to 700. Needless to say, the chief source material for most of the essays is to be found in the coins of the Empire and the successor kingdoms. The verdict of careful study is that the volume contains a large amount of important new material, economically expressed and well illustrated, so that no library with readers of the relevant periods can go without it.

Many of the essays publish basic new material: Robert Carson illustrates a hoard of gold around the year 300 from the Mediterranean, F. Baratte a Christian silver dish from somewhere in Gaul, H. G. Pflaum a 3rd century hoard – or perhaps another part of a known hoard – from Syria, M. Dhénin some silver copies of late Roman silver coins from graves in the north of France, and C. Martin a small hoard of silver copies of Byzantine silver coins of *c.* 530–70 found in Switzerland. Other essays publish material which has not been brought together before: Peter Berghaus on Merovingian coins in the museum of Münster, E. Demougeot on the occasions when a party of Franks could have stolen genuine 4th century coin dies from Trier, R. Göbl on ancient representations of coining on coins and related materials, and X. Barral i Altet on Suevic coins with finely engraved countermarks. These are listed to give an idea of the scope of the volume, the way that it hangs together, and because, since they are all factual, they give little scope for disagreement.

Taking some of the more thematic of the remaining articles in order we start with the first one, on the importance of Imperial and other portraits in the later Empire, by Professor Maria Alföldi. This includes a run through the basic references, but then branches out into wider fields in which she considers the portrayal of the apostles, and shows how they appear as 'Senatoren im Reiche Christi' – a fresh way of expressing it. The comparison of St Michael, Archangel, as Magister Militum in a heavenly sense, is another nice touch. Pierre Bastien looks at the appearance of an altar as a part of the mint-mark at Lyon round the year 300, and, perhaps not surprisingly, concludes that it is a kind gesture to the Assembly of the Gauls. MM. Cabarrot and Nony discuss the circulation of 4th century coin copies at Bordeaux, but their discussion is marred by a failure to take into account some of the excellent work being done in France, not all that far from Bordeaux in fact, never mind the more exotic information available from Portugal and Britain. André Chastagnol puts forward very concisely the basis for a secure chronology of the years 275–85, and Michel Christol examines the fact and the theology of Diocletian's rise to power.

Mlle Huvelin is able to isolate a special issue of coins of Claudius II which makes sense of what had been to date a number of badly recorded loose ends, Mlle Lallemand looks at the behaviour of both regular and irregular radiate coins in Belgium, and Xavier Loriot adds the departement of Eure to his list of fully recorded hoards. The article by E. Bernareggi discusses forgeries of Lombardic coins in Italy, distinguishing between 'falsi inventati' called for by the 19th century 'collezionismo' and interest in national roots, and the far less acceptable 'falsi copiati' of the far less exciting coin collecting. It is still a delight to translate literally from Italian, so that the 'falsi inventati' which *infest* the older collections will stay with me for days. The last paper in the volume is a welcome contribution from Sofia in which Mme Youroukova compares the coins from two sites, near Pernik and near Sadovetz, showing how in the first case scattered site finds of the 6th century suggest a regular army or administrative post, whereas at the second, coins of the same dates all in hoards may be connected to an army post manned by irregular or German troops.

Jean-Pierre Callu examines in detail, with footnotes greater in length than the essay, a type of Theodebert I, and gets some very useful political information from it. This leads us on to my two favourite articles by Claude Brenot and Cécile Morrisson which deal with two remarkably unlovely groups of coins, both around the year 500, the first from Marseille the second from Algeria. The two groups show what might be almost the theme of this volume – the emergence of a copper coinage of local use from the ruins of the late Roman system, which, in turn, leads on to the autonomous coinages of the later kingdoms.

RICHARD REECE

MORRISON, John, *Long ships and round ships: warfare and trade in the Mediterranean 3000 BC–500 AD* (The Ship 2). London, HMSO, 1980. 60 pp., 42 pls. £2.95.

This small booklet in The Ship series, currently being produced by the National Maritime Museum, is a short study of the development of 'long' warships and 'round' merchant ships in the Mediterranean. Chronologically it covers the period from the Bronze Age to the decline of the Roman empire; and indeed has an excellent chronological table of the material used in this account.

However the author very largely concentrates on warship development, making much use of literary and iconographic evidence. His use of these sources is somewhat lacking in caution as iconographic material is rarely anything like accurate in portraying boats of most periods up to the present day. Curiously he does not make much use of the archaeological evidence at all which, although it may be a small sample of the whole, is not subject to the inaccuracies of manifold subjective interpretations or artistic convention. This booklet however is a useful guide to the development of warships in the classical period of the eastern Mediterranean.

D. GOODBURN

RUNCIMAN, Steven. *Mistra, Byzantine capital of the Peloponnese.* London, Thames & Hudson, 1980. 160 pp., 26 pls. £9.50.

Perhaps no other scholar has done more to awaken interest in the Byzantine Empire. Certainly the flourishing state of modern Greek studies is indebted to Runciman and his followers. In this latest study we find the same deep learning and graceful style that so impressed Lytton Strachey 50 years ago when he read *The Emperor Romanus Lecapenus* (I suppose that Strachey would have approved the lack of references in *Mistra,* although the student who wishes to delve into the sources will regret the author's lapse from his earlier standards of presentation).

Much of the book is taken up with a history of Mistra. It originated as a Frankish fortress, built by William de Villehardouin, in 1249. Later, with the revival of Greek independance in the Peloponnese (1262), it first replaced Lacedemonia as the chief city of the Vale of Sparta and then, before the end of the 13th century it became the capital of the province, the seat of the governor. This official (*Epitropos*) was always of high rank, and often had blood-ties with the Imperial family. Indeed after 1349 when John Cantacuzenus appointed his younger son, Manuel, to the post it became a virtually autonomous apanage of the Empire. Under its governors, who as cadet-emperors bore the title of despot, art and philosophy flourished more freely than at Constantinople, the centre of the declining Byzantine state.

The artistic exuberance is fortunately still apparent to those who visit Mistra today and study the frescoes in its churches. Less obvious, though even more important, is the work of George Gemistus Plethon and his pupils, especially Cardinal Bessarion who did so much to bring the humanism of Greek antiquity to early Renaissance Italy. Both of these cultural manifestations of late Byzantine life could have been accorded more space, but at least information about them is very readily available elsewhere.

Much more unfortunate is the failure to make use of archaeological and topographical information. No book on a Western city, London or Paris or Amsterdam, would be complete without adequate maps (the sketch-plan on page 94 is almost useless) and some assessment of the types of house in which people lived. The medieval Greeks did not *live* in churches and surely there should have been a section on vernacular architecture? In particular, I would like to have known whether the fall of Mistra to the Turks in 1460 made any difference in such a tradition or are the house remains whose ruins cover the hillside still essentially Byzantine? Also, what of the place of Mistra in the economy of the Vale of Sparta and of the Peloponnese in general? Runciman tells us all too little here.

However, it is clear that this sprawling hill town provides a splendid opportunity for archaeologists to explore every aspect of material daily life from the late middle ages until the end of the 18th century. Unlike other settlements, it has been virtually abandoned since its sack by Ibrahim's savage army in 1824 during the Greek War of Independence. The importance of the site is unquestioned and at least Sir Steven Runciman's book may stimulate investigations on lines that have been pioneered in Poland, England, France, Scandinavia and the Low Countries.

I most certainly agree about 'the incomparable beauty of the hollow vale of Sparta' (which, indeed, had not a little to do with the original Frankish settlement of La Crémonie) and the friendliness of the local inhabitants. The travelling public, reading this book, will certainly wish to include Mistra on the itinerary; the armchair archaeologist may well be fired to know much more. *Mistra* is but a start: now dig on!

MARTIN HENIG

WILSON, David M. (*ed.*). *The northern world: the history and heritage of northern Europe.* London, Thames & Hudson, 1980. 248 pp. illus. £15.00.

This book follows a pattern which Thames & Hudson set down over 20 years ago in their volumes on the Dark Ages, the flowering of the Middle Ages, and other titles which combined history, archaeology, and illustrations of high quality. A distinguished scholar, in this case the Director of the British Museum, takes on the job of editor and persuades a team of friends and colleagues to join him in exploring the given subject. This offering describes 'the history and heritage of northern Europe, AD 400–1100'. Criticism is difficult because the eight essays in the book are obviously all different, coverage of both the time-scale and the geographical area are uneven, and, one suspects, the fact that the illustrations do not always mirror the text in the way that they should is probably more the fault of the publisher than of the editor or the authors.

Three essays hang particularly well together, those by Catherine Hills on the Anglo-Saxon settlement of England, by James Graham-Campbell on the Celtic contribution, and by Joachim Herrmann on the Northern Slavs. In each case the field is well set out, once mapped it is carefully covered, and in each case there is a breath of fresh air, not so much in rousing new-fangled theories, but in the cool and cautious dealing with entrenched positions and established views. These contributions suggest that at last the material of archaeology is to be allowed to speak for itself, even if it contradicts other more historical sources, and there is an awareness of the fact that new developments such as pollen analysis and the characterisation of pottery might enable the construction of an alternative background to the early Middle Ages against which received doctrine may be checked.

At the other end of the scale the essay by H. Ament on the Germanic tribes in Europe rather depressed me for the windows were firmly shut, the period divisions were firmly down, and new techniques are obviously not needed because we already know most of what there is to be known. In between come the Vikings playing at home, Else Roesdahl, and away, David Wilson. Whether playing at home or away the Viking team seem to carry all before them with Dr Wilson as enthusiastic a pack-leader as any Eric or Harald. In the first essay Christine Fell has the difficult task of summarising present knowledge of the gods and heroes of the northern world. She guides the reader carefully through the complementary sources and sifts out the main names and careers from the daunting background; at the same time she points out the changing views and attitudes to this pagan mythology and tries to disentangle what a Viking might actually have thought from what a medieval Christian or Richard Wagner *thought* the Viking thought. The illustrations for this chapter are obviously rather sparse and difficult to interpret if they are restricted to scenes produced in the original lifetime of the myths, and some illustrations are used in this chapter which poach a little on the last essay by Jöran Mjöberg on romanticism and revival. In this chapter the illustrations, which deal mainly with painting and book illustration, really are complementary to the text which is concerned particularly with attitudes and writings.

The occasional slips have come through an otherwise high standard of production. I am worried by the Crusaders on p. 30 who are sacking Jerusalem on the Franks casket in the 8th century, and on p. 42 the word 'feature' is surprisingly general to describe Wayland's Smithy. The Nibelungenlied is

mentioned several times by Fell, including the person of Atli or Attila, and the use of Attila and the Huns to wipe out the Burgundians is mentioned by Ament, but no connections are made between the two. Childeric on p. 48, if you have the patience to find out which p. 48 actually is, for those wretched people the designers seem to have taken a dislike to putting numbers on many pages and illustrations, is banished to north-western France, and on p. 62 the phrase 'a javelin (francisca)', is an unusual equation.

The best of these essays form a very useful basis for further reading and make excellent introductions to their various subjects, just as their authors intended; every essay is definitely of use, and most of them contain material which is not available elsewhere in as up-to-date a form. Once again the composite volume has succeeded.

RICHARD REECE

AURORA MARTIN, A., JAVIER NIETO, F. and NOLLA, J. M. *Excavaciones en la Ciudadela de Roses (Campaña 1976 y 1977)* (Girona: Serie Mongrafica 2). Girona, Disputacion Provincial, 1979. 391 pp., illus. No price given.

This is a very thorough report on the preliminary excavations carried out within the Ciudadela (citadel) de Roses during 1976 and 1977. For what it achieves and represents it should be considered as a milestone in Spanish archaeology. The modern port of Roses is situated on the alluvial plain immediately below the Cabo de Creus at the north end of the Golfo de Roses, and within the Alt Empordá (Provincia de Girona). Founded as Rhodian colony in the 8th century BC, the site has been miraculously preserved beneath the 16th century *enceinte* of the Ciudadela, and offers an archaeological horizon of at least 1,500 years. The work presented here represents the first results of a co-ordinated project mounted by the Servei d'Investigacions Arqueologiques de la Diputació de Girona (and with which this reviewer is involved), that is centred on the long-term excavation and publication of the site. Although it had been excavated haphazardly by Miguel Oliva over the past 20-odd years, no stratigraphic sequence or pottery typology was ever published. Hence the first priority was to establish one in the most characteristic parts of the site – namely, within the late Roman villa complex (Habitaciones G.IVB and 04), in the surviving Hellenistic quarter (Barrio Helenistico) and in the vicinity of the old Akropolis of Rhode (now the 11th century church of Sta Maria).

Several interesting points are raised by the results. Although we have literary evidence as to the foundation of Rhode in the 8th century BC (*Strabo* III.4, 9 (XV, 2, 10)), there is no archaeological evidence prior to the 5th century BC. Further excavation in the vicinity of Sta Maria will no doubt shed further light on this problem, and the finds encountered will provide a valuable cross-check with those from the Illa d'En Reixac (antecedent to the Iberic Oppidum of Ullastret), Emporion (Ampurias), Porqueres and other important sites of the period. The most important period of the colony of Rhode would seem to be in the 4th and 3rd centuries BC, when it covered the greater part of the Ciudadela, and vied with Emporion in terms of its productive economy. The most characteristic product at this time was the Precampanian Black Glaze pottery ('Pateras de tres Palmetas radiales', etc., which mostly imitate the small bowls – Lamboglia form 26 – and one whose kilns was found during the 1979 excavations; see pp. 219 ff.), and which has a wide distribution within Catalonia and western Languedoc. Its economic potential is also reflected in its characteristic issue of silver drachmae, and two (?) bronze issues on different weight standards. Although the later Palaeochristian Necropolis has destroyed many stratigraphical relationships within the town at this period, the colony would seem to have been abandoned by the late 3rd or early 2nd century BC. The precise nature of this needs to be examined more closely, but two explanations have been proffered. Firstly, that is was forcibly abandoned on account of action taken by its commercial rivals Massalia (Marseilles), and Emporion, the latter of which subsequently dominated all commercial activity to the south of Massalia until the Late Republic. Alternatively it could correspond to a mention by *Livy* (XXXIV, 8.4), that the *Castellum* of Rhode was taken by Cato in his pacification campaign of Hispania Citerior in the early 2nd century BC.

There is no substantial evidence for human activity within the town prior to the late 2nd/early 3rd century AD (see however, early materials in Stratum VI; in addition an important deposit of 1st century AD pottery was found during the 1979 excavations). This saw the construction of a building with at least two rooms which comprised stone walls and Opus Signinum floors. It is unknown whether these correspond to a town house or agricultural villa (a point which highlights our uncertainty to the precise nature of the site of the former colony in the Roman Imperial period). In any event it was decommissioned after a fire in the early to mid-4th century AD and replaced by a large complex covering three sides of a courtyard and which faced the sea. This was clearly a working villa of some scale, principally involved in the exploitation of the rich offshore marine life and production of *Garum* (*Ausonius* 'Muria Barcinonesia': Epistulae XXIII. This reflected by the find of installations for its production in 1978). The villa saw continued occupation with minor changes down to an apparently phased abandonment in the late 5th century AD (Stratum II). This area, as indeed in the rest of the

Ciudadela, was then used as a necropolis, whose focus was on the Palaeochristian basilica beneath the church of Sta Maria.

It is in fact in the classification of the materials that the heart of the book really lies. For the first time we have a wholly published ceramic sequence from a coastal Spanish site, and the authors have opted for the very thorough – albeit unnecessarily bulky – descriptive method employed by Carandini and Panella in the Ostia publications. The importance of the materials is a little comprised by the simplicity of the stratigraphy. Nevertheless, worthy of attention is the mainly 3rd century material from Hab. 04; the 3rd and 4th century AD material from Stratum IIIC, and the variety of late Gallic and North African imports in abandonment level (Stratum II) – from Hab. GIVB. In the Barrio Hellenistico, the potential of the site is indicated by a rich variety of imported Skyphoi, Attic ware, Gris Emporitana (local), Campanian A, the local Precampanian products, Greco-Italic amphorae and a large variety of hand-thrown and wheel-turned Iberic pottery.

There are obviously a few faults in this publication – such as the absence of a general location map, or overall excavation plan. Some of the drawings could have been successfully reduced to save space. In addition there is also an element of the Spanish tendency to oversimplify interpretations of the archaeological evidence. However, this should not detract from the importance of this work and its significance in a Spanish context. In recent years administrative changes have brought Spanish archaeology to a crossroads, where it faces two choices. Increased decentralisation of control over excavation that would lead to more projects such as this, and more thorough publication. Alternatively, a maintenance of the *status quo* that would effectively hinder the publication of old excavation material, the introduction of new techniques or the initiation of new long-term projects. For a researcher in Spain it is often very frustrating to find that what some excavations achieve in the publication of sheer undigested fact (see, for instance, *Pollentia* II – Excavaciones en sa Portella, Alcudia (Majorca), *Excavaciones Arqueologicas en Espana*, nr. 98), is only complemented by others with the briefest of notes. It is, for instance, a chastening thought that in nearby Ampurias, a site of crucial importance and which in every sense complements Roses, there has not been a single stratigraphic sequence published in the Roman town or Neapolis since the work by Almagro and Lamboglia in the 1950s – despite a large programme of continuous excavation.

It is perhaps significant, then, that one of the people to whom this work should be dedicated is Nino Lamboglia, who was responsible for laying the foundations of archaeology in the Mediterranean. Former students of his initiated the long overdue change in Italian archaeology through the publication of the excavations of the Terme del Nuotatore, at Ostia. One hopes that the example set by the authors of this volume, similarly former students of Lamboglia, may initiate a similar trend in Spain.

SIMON J. KEAY

COTTRELL, L. *Reading the past: the story of deciphering ancient languages.* London, Dent, 1972. 182 pp., illus. 75p.

POPE, M. *The story of decipherment: from Egyptian hieroglyphic to Linear B.* London, Thames & Hudson, 1975. 216 pp., 118 figs. £4.25.

These two accounts of the major decipherments follow the publication in English of at least four others, by J. Friedrich (1957), P. E. Cleator (1959), E. Doblhofer (1961) and C. H. Gordon (1968).

Cottrell, evidently writing for the non-specialist, summarises classical authors' testimony on Egyptian writing, and outlines fairly clearly the main stages in its decipherment – the suggestion that cartouches contained royal names, comparison of the Greek and demotic texts of the Rosetta Stone, Champollion's reading of foreign and native names. A varied chapter entitled 'What the Ancient Egyptian Writings Tell Us' gives no cohesive sketch of Egyptian civilisation. The decipherment of Old Persian is recounted inaccurately (Niebuhr isolated '42 characters, of which 32 proved to be correct', Grotefend identified 'four rulers, three of whom were kings, and two bearing the same name, Darius', and so on), while that of Babylonian cuneiform is merely attributed to 'correlation with the Persian text'. One-third of a disjointed chapter on Mesopotamia deals with the Gilgamesh Epic, garbling the story of the Flood (whereby 'evil Enlil' punished man's 'countless misdeeds'). Cottrell next describes Schliemann's excavations at Mycenae and Evans's in Crete, summarising well the ensuing debate on the relationships between the Bronze Age cultures of Greece and Crete, and the essential steps in deciphering Linear B – Kober's detection of inflexions and Ventris's abstract syllabic grid and discovery of place-names. The discussion on the historical implications of the Linear B tablets is occasionally confused (pp. 153 f., 158 ff). Long biographical digressions, particularly on Champollion, Rawlinson, George Smith and Ventris, are interspersed. There are many errors – e.g. 'Inanna the moon-goddess' (p. 106) and Hittite Hieroglyphic described as undeciphered (p. 167) – and dogmatic pronouncements, e.g. that Egypt borrowed writing from Sumer (p. 96), that Ur's population exceeded one million (p. 110) and that Linear A is north-west Semitic (p. 167).

Pope surveys classical reports on Egypt, and shows how belief in the sacred impenetrability of Egyptian writing arose and was dispelled. A thorough account (with attention to priority claims) of the work of Åkerblad, Young and Champollion is spoilt by poorly drawn hieroglyphs and confusing, sometimes incorrect, transcriptions. After accounts of the prerequisite decipherments of Palmyrene Aramaic and Sassanid Persian, Grotefend's crucial identification in Old Persian of the names 'Hystaspes, Darius, Xerxes' is explained verbally but illustrated solely by a chart published (with misprints) in 1815, nowhere referring to Hystaspes. The decipherment (as opposed to its results) of Babylonian cuneiform, which 'involved no great problems of strategy', is hardly mentioned, although Rawlinson's abundant papers reached the British Library (Add. 47619 ff.) in 1951. Ugaritic, the Cypriote syllabary and Hittite Hieroglyphic are discussed lucidly. An examination of Evans's views on Cretan writing introduces somewhat confusing accounts and illustrations of Kober's and much of Ventris's work on Linear B; the latter's contextual and orthographic analyses, identification of town names, and completion of the decipherment are, however, ably described. Many illustrations are unclear (e.g. half the transcription in no. 81 is written backwards), including some reproduced, at times indistinctly, from contemporary diagrams.

Much space is devoted to earlier decipherment attempts and the development from the Renaissance onward of the intellectual framework which successful decipherments presupposed. Despite their historical interest, one would willingly sacrifice many of these sometimes prolix discussions (e.g. on Colonna's invented hieroglyphs or Warburton's theory of communication) for fuller treatment of the decipherments themselves. Pope concludes with a valuable comparative analysis of decipherment processes, remarking that many correct conclusions resulted from faulty reasoning.

Friedrich's *Entzifferung Verschollener Schriften und Sprachen* (revised edn 1966, English translation 1957), which includes undeciphered and partially deciphered scripts and lost languages in known scripts (e.g. Sumerian), remains indispensable.

M. P. WEITZMAN

DE CARDI, Beatrice (*ed.*). *Qatar Archaeological Report: Excavations, 1973.* Oxford, published for the Qatar National Museum by the Oxford University Press, 1978. xviii + 218 pp., 4 colour and 32 monochrome pls., 15 figs., 8 tables. £20.00

Until fairly recently comparatively little was known about the archaeological traces of Arabia's historic and prehistoric past; obviously a most regrettable state of things in view of what was either known or suspected about the important role the Peninsula had played in the history of the Semitic-speaking peoples, international trade in ancient times, and indeed in world history in general. Fortunately the past few years have witnessed an important change: systematic field surveys and selective excavation are being applied increasingly to many parts of Arabia by foreign and now also by Arabian scholars. The book here under review forms an important contribution to the rapidly increasing literature concerned with this branch of study.

It has to be said at the outset that the Qatar Peninsula, with which this work is concerned, forms one of those parts of the Gulf side of Arabia which are poorly endowed by nature. Even though in past times conditions were somewhat more favourable to man, hunting, fishing, and pastoralism were probably always the main occupations which helped a rather sparse population to exist here. The antiquities so far revealed in Qatar are accordingly not in themselves impressive, especially when compared with those found in more favoured Arabian regions like the Yemen: ancient urban settlements and tells are unknown, and no impressive buildings have so far been found: flint knapping and camping sites, fishermen's temporary abodes, besides some not very well constructed and badly dated cairns make up the repertoire. It is of course true that any addition to knowledge about early Arabia is important, and this applies moreover with special force to Stone Age cultures, outstanding basic research concerning which was done in Qatar some years ago by H. Kapel (*Atlas of the Stone Age cultures of Qatar,* Aarhus, 1967). The fact that this report forms a most important contribution to archaeological knowledge about Arabia and her neighbours is nevertheless to some extent due to the impressive scholarly craftsmanship with which the local traces of antiquity were investigated by the British mission headed by the editor between November 1973 and January 1974, and the highly competent way in which the findings were thereafter studied and presented by her and members of the team as well as outside contributors.

The book comprises 16 chapters, including an introduction by the editor giving a summary of results, as well as an outline of the physical geography of Qatar; there is also, at the end of the book, a most useful gazetteer of sites and finds by the editor, besides two indexes (of proper names and subjects). Of the main chapters, two may be regarded as providing a general framework. Chapter 2 by C. Vita-Finzi deals with environmental history (including coastal sequences, sea level chronology, continental deposits, and continental chronology, and their archaeological implications; in this latter

section an attempt is also made to outline the development of the coastline of the Gulf between 15000 and 8000 BP). Chapter 13 by Professor R. B. Serjeant offers an historical sketch of the Gulf in the Islamic era from the 7th to the 18th century AD (including, for example, sections on the ancient ports of Siraf, Qais, and Hurmuz, and on Portuguese activity in the Gulf, and on the rise of local states, as well as on the past of Qatar itself). These are both excellent chapters.

Of a more general scope also is Chapter 3 by Joan Oates on 'Ubaid Mesopotamia and its relations to Gulf countries. This chapter outlines the general development of, and field of distribution occupied by, 'Ubaid wares in the Near East, and it discusses the relevant finds from Qatar and neighbouring Arabian regions within this framework (reference is made also, in an 'additional note', to the paper by Oates, Davidson, Kamilli and McKerrell in the, then, forthcoming paper in *Antiquity*, LI, 1977: 221 ff.). The 'Ubaid ware finds are here related to importation by seaborne visitors from southern Mesopotamia who visited Qatar over a considerable period of time without however settling there – the purpose of such visits (fishing? pearling? trade?) remaining uncertain. Associated red coarse pottery was locally made, but its manufacture did not survive the period of 'Ubaid contacts. A wider perspective also characterises Chapter 4 on the stone industries of Qatar, by G. H. Smith. Here the sequence of Stone Age tools originally worked out by Kapel is reviewed with reference to the whole of Arabia and neighbouring regions: the new discoveries in Qatar are of importance particularly where Kapel's groups C and D are concerned (the C group now turns out to be Neolithic and should be included with the D group; while the D group itself should be subdivided into several phases).

The remaining chapters in the Report offer detailed descriptions of the excavations undertaken by the expedition at various sites (including a number of cairn excavations), mainly by G. H. Smith, D. G. Buckley, and P. S. Garlake. Description and interpretation are given separately, and due regard is had to the setting of sites in their ancient environment. The text of these reports as well as accompanying plans, diagrams, and illustrations are excellent, and present a clear picture of what was found in each case; another laudable feature is the way in which the findings are reviewed in their wider context. The reader is in fact offered a conspectus of developments in the Gulf region as a whole, and in the later periods of the trade links which connected the coastlands from Mesopotamia on one side to India on the other; only of early links with Egypt, which V. G. Childe taught us to look for, there is at present no trace.

The printing, quality of plates, etc., are of a standard which is unfortunately becoming rare. Altogether this is an excellent and very important book. Miss de Cardi and her collaborators have put us much in their debt.

B. S. J. ISSERLIN

MATTHERS, J. (*ed.*). *The River Qoueiq, Northern Syria, and its catchment: studies arising from the Tell Rifa'at survey 1977–79* (BAR Int. Ser. 98 (i and ii)). Oxford, British Archaeological Reports, 1981. 510 pp., illus., maps, plans. £23.00.

John Matthers has assembled, with admirable promptness, a creditable and informative group of specialist contributions to his report on the Qoueiq Valley survey. The project, which is the culmination of three seasons' work in the Qoueiq Basin, north and south of Aleppo, was developed as an extension of his work on publication of Seton-Williams's excavations at Tell Rifa'at. He has been able to use his findings at Bronze and Iron Age Rifa'at for comparative purposes in his survey sherd analysis and has published a number of sections and pottery drawings from the site in this account.

Matthers introduces the work with a brief outline of survey methods and limitations. Short descriptions of the 88 sites visited are accompanied by a selection of excellent photographs, and 13 contour plans produced by Waywell and Wickens. The physical setting is concisely discussed by Dorrell whose contribution is followed by the detailed analyses of the material collected on survey.

A clear and comprehensive account of the evidence for flint industries is given by Lorraine Copeland. Sections on the Neolithic – EB IV, Late EB IV – IA, Hellenistic and Roman fine ware, Roman and Islamic coarse ware and Islamic glazed pottery are presented by Mellaart, Matthers, Kenrick, Northedge and Bernus Taylor, respectively. John Tubb deals with the MBA painted sherds and an interesting account of the kiln dump at Tell Kadrich is given by McGrath and Grabrovaz. The petrological examinations of EB IV and Mycenean sherd fabrics are discussed by Riley, and a note on EBA sealings, by Dominique Collon, appears in Appendix A.

Mellaart's contribution, delightful for its characteristic combination of good sense, humorous touches and a number of debatable conclusions, is of particular interest to the reviewer. He bases his classification of the Qoueiq sherd material on that which was established by the Braidwoods (1960) for the Amuq sequence. He correctly emphasises that Syrian Halaf and Northern Ubaid wares are of local origin. Like the Braidwoods, he confines the succeeding chaff- or straw-faced wares to Phase F (with the exception of bevelled rim bowls which also occur in early Phase G). It does seem, however,

that the division between these phases cannot be so easily defined. Chaff-faced wares, very similar in fabric and form to examples from Tell Berne (Fig. 146) and other sites in the Qoueiq Basin (Fig. 144, 731–35), were found at Tell Brak, east Syria, in a level which may be equated with early Amuq G. This local chaff-faced pottery tradition seems, as the Braidwoods point out (1960: 515), to cover much the same areas of distribution as the preceding Northern Ubaid. I am surprised to find that Mellaart confines the triangular-lug-handled ware to Amuq/Qoueiq Phases G and H (p. 156 and Figs. 161–2). The ware is found in north and east Syria at least as late as Amuq I (see Kühne, 1976: 99–103).

Hillman, in his important appendices on cereal remains from three sites, underlines a point made by other contributors which is only too obvious – that a controlled modern excavation in this area is badly needed in order to obtain a pottery sequence (which is lacking for most of the historic period) and more detailed information about the chronology, early farming and economy of a region which has hitherto received scant archaeological attention.

John Matthers is to be praised for ensuring that there are plenty of pottery illustrations, charts and maps in his report, and for refraining from any attempt to interpret his survey evidence in the light of possible settlement distribution and so on. Of the sites visited, only nine were not recorded on the printed map; many more must lie undiscovered within this area.

The work forms an extremely useful corpus of material for current researchers in the field.

References

Braidwood, R. J. and L. S. 1961 *Excavations in the Plain of Antioch, Vol. I,* Oriental Institute Publications, Vol. 61. Chicago.

Kühne, H. 1976 *Die Keramik vom Tell Chuera und ihrer Beziehungen zu Funden aus Syrien-Pälastina, der Türkei und dem Iraq.* Berlin.

KATE FIELDEN

FRANKEN, H. J. and KALSBEEK, J. *Potters of a medieval village in the Jordan Valley: excavations at Tell Deir 'Alla: a medieval tell, Tell Aby Gourdon, Jordan.* Amsterdam, North-Holland Publishing Company, 1975. 222 pp., 77 figs. $20.95 (Dgl. 50.00).

This is a short book, containing a mere 11 chapters, and yet the authors have managed to contain a great deal of matter in this small compass. Chapter One deals with the background to the excavation and sets out the stratigraphic context from which the pottery studied in the later chapters comes. Chapter Two, entitled 'Methods of Study', sets out Franken's ideas on ceramic typology, the use of models in the study of the process of ceramic manufacturing, and defines the terminology and techniques of his method. Chapter Three, by Kalsbeek, is a detailed study of 'Pottery Making Techniques', as implied by its title. Chapters Four to Nine inclusive are the detailed analyses of the various fabrics by manufacturing type and chronological period. Chapter Ten is the report of the detailed 'Petrographic Analysis' of the sherds, and Chapter Eleven, 'The Repertoire, the Traditions and the Models', brings all of the evidence from the various analyses together and offers the authors' conclusions.

This book is a very mixed bag in a number of ways. On the one hand, the authors have made an important contribution to our knowledge of the processes by which some of the medieval pottery of the Jordan Valley was manufactured and have provided a new taxonomic system within which this pottery, and, indeed, that of any other period or locale may be classified according to manufacturing process and physical properties rather than on form and external appearance. These are solid achievements.

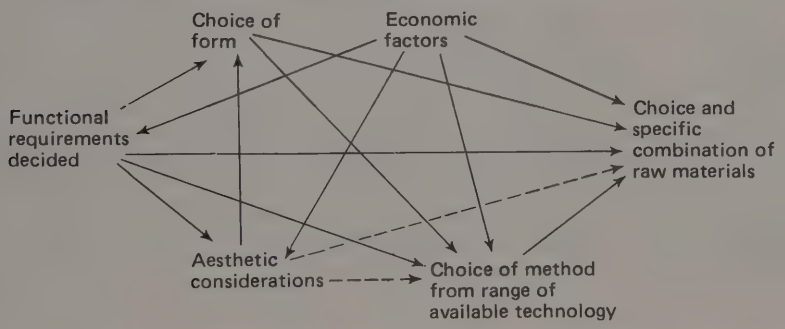
On the other hand, this book suffers from a number of serious and fundamental weaknesses. For example, the excavation at Tell Abu Gourdan was undertaken in order to provide a body of stratigraphically reliable pottery with which to date a medieval Arabic cemetery on the nearby site of Tell Deir 'Alla. Yet the sounding which was designed to provide this material consisted of only one 5 m square. This in itself is, statistically, an extremely unreliable sample when measured against the extent of the occupational area of Tell Abu Gourdan (as shown in Fig. 1). Moreover, all of the successive deposits were fills from a series of courtyards. This means that the sherd-sample at each stratigraphic/chronological horizon was from exactly the same cultural context; the courtyard of a building of unspecified character. As the excavation was, presumably, intended to provide a representative sample of the repertoire (in Franken's terms) at each chronological horizon, this must be regarded as somewhat unfortunate, as it almost certainly introduces a distortion of the picture of the range of forms and fabrics manufactured. These weaknesses are, in part, recognised by Franken (1975: 2–3). Another advantage which might have accrued from the clearance of a larger area would have been related to the problem of the apparent gaps in occupation identified by Franken between Phases G and H, and Phases M and N. It is well known that in stratified village sites not all of the area of the site

is necessarily occupied all of the time (Chang, K. C., *Rethinking archaeology*, 26–30, New York, Random House, 1967; Hamilton, R. W., 'Excavations at Tell Abu Hawam', *Quarterly of the Department of Antiquities of Palestine*, **IV**, 1934; 1–2). If this was the case at Tell Abu Gourdan, then a second sounding at some distance from the first might have either bridged these apparent gaps, or provided a clearer stratigraphic and artefactual confirmation of their existence.

It is also worth pointing out that in section 2, Franken gives the impression that there was no comparative material upon which he could draw for dating purposes. That this was not, in fact, the case is shown by his own (less than exhaustive) bibliography on page xiv.

Chapter Two of this book is, in many ways, the most important in the book. This chapter contains the entire conceptual framework for both the analytical methodology and the typological system which occupy the remainder of the book and shape Franken's cultural interpretations of the material studied. It is in the nature and reliability of this framework that a large proportion of the most serious weaknesses of the book lie. In the first two paragraphs of this chapter Franken asserts that a pottery typology is 'reliable' only to the extent that it is based on 'the material used by the potters, the methods employed in potmaking, and the tradition of potmaking inherited by the potters' (para 2, page 15). This, of course, results in a taxonomic system which ignores the significance of function as a determining factor in relation to both the form and the fabric (including the manufacturing techniques used). It is important to recognise that this taxonomic system, like all others, is an artificial, symbolic construct imposed on the body of material classified for a particular purpose, and that a taxonomic system which perfectly fulfils one purpose may be useless for another. It is also important to recognise that the same body of material may be classified in a large number of different ways for different purposes, each classification remaining 'reliable' in terms of its own purpose and definitions and no other (Simpson, G. G., The meaning of taxonomic statements, in Washburn, S. L., *Classification and human evolution*, 1–16, Chicago, Aldine Publishing Company, 1963. On these grounds alone Franken's denunciation of all other pottery taxonomies is wholly unjustified.

As a result of the removal of function from the study of pottery, Franken appears to have reached the conclusion that the primary factors determining the shape of a vessel are the physical properties of the particular blend of raw materials and the nature of the technology used to work this blend, in that order. This reasoning is wholly unacceptable. The form of a vessel is determined by culturally imposed functional requirements (Chang, K. C., *Rethinking Archaeology*, 112, New York, Random House, 1967). These functional requirements directly influence aesthetic considerations, which themselves affect choice of form to a variable extent, and may, in certain circumstances, also affect choice of manufacturing technique, and choice and specific combination of raw materials. The functional requirements directly affect the choice of manufacturing method from the range of techniques available to the potter, and the choice and specific combination of raw materials. In addition to these factors, functional requirements, aesthetic considerations, choice of manufacturing method, and choice of raw materials are all subject to both direct and indirect economic influences of great complexity. This may, perhaps, be most clearly expressed in the form of a diagram.


Choice of form
Economic factors
Functional requirements decided
Choice and specific combination of raw materials
Aesthetic considerations
Choice of method from range of available technology

Franken's rejection of the role of function in pottery has also resulted in the statement that 'Publication of pottery serves archaeology in two ways. First, it familiarises archaeologists with the pottery from one location and period. To this is added the classification of material according to stratum and sometimes locus, and the reporting of information that could not be derived from a drawing. Secondly, comparison of one group of pottery with another can date the level from which it was found' (para 4, page 21). This statement is true as far as it goes, but it does not go very far. Because the forms of vessels are culturally determined, and because all pottery was and is manufactured

on purpose to fulfil a function, or a set of functions, the understanding of the function of the individual vessels and the groups of vessels which are recovered in an excavation is of fundamental importance in the cultural analysis of archaeological remains. Pottery can yield a great range of information on the nature and distribution (in space and time) of cultural activities, and on the nature of the social and political structures of the culture under study. Franken's assertion that, 'It has yet to be determined, even in the present stage in the archaeological study of pottery, which information acquired through the analysis of ceramic materials is significant for archaeology' (Franken, 1975: 26) simply is not true.

In the end, one may come to feel about this minute concern with the manufacturing methods of pottery much as Berreman feels about certain types of ethnographic analysis, '. . . none of these descriptions, whatever the virtues, can in themselves be called very significant. They remind me of Mill's warning that many sociologists have gotten to the point where they overlook what is important in their search for what is verifiable, and that . . . . Many have worked so hard on what is trivial that it comes to appear important . . . .' (Berreman, G. D., 'Anemic and emetic analyses in social anthropology', in *American Anthropologist*, **68**, 1966: 351).

In sum, this is a book whose real contribution to the study of pottery is overshadowed by its great weaknesses.

RUPERT CHAPMAN

MALLOWAN, Max. *Mallowan's Memoirs.* London, Collins, 1977. 320 pp., illus. £6.95.

Max Mallowan had the good luck to be introduced to archaeology at Ur, under the auspices of Sir Leonard Woolley, and his description of Woolley might well be applied to himself: '. . . Woolley, always amiable, studiously polite and usually genial, was something of a tyrant as all successful heads of expeditions have to be, but he was always just and never expected more than he gave himself'. Mallowan gives us, in his *Memoirs,* a fascinating eye-witness account of the discovery of the Royal Cemetery, interspersed with amusing descriptions of 'dig life'. After five seasons as Woolley's assistant Mallowan joined Campbell Thompson at Nineveh, a great contrast in every way to his life at Ur. By this time he had married Agatha Christie, and she accompanied him to Nineveh and all his subsequent expeditions. At Nineveh he made a very important sounding, 90 ft deep, which stratified for the first time in their correct order Samarran, Halafian and Ubaid wares. After Nineveh he struck out on his own and excavated Arpachiyah, Chagar Bazar and Tell Brak. This series of excavations was interrupted by the war, during which Mallowan served in the RAF.

He was demobilised in 1945 and shortly after took up the post of Professor of Western Asiatic Archaeology at the Institute of Archaeology, University of London, which he held from 1947 to 1962. He much enjoyed teaching and was a very conscientious teacher. His academic duties did not put a stop to his field work, and every spring term he went to Iraq as chairman of the British School of Archaeology in Iraq and excavated Layard's site of Nineveh from 1949 to 1960. His finds of tablets, spectacular ivories, etc., have all been described in detail in his book *Nimrud and its remains.* He left the Institute of Archaeology when he was appointed a Fellow of All Souls. This gave him time to write and, like Petrie, he is to be congratulated on publishing all his excavations.

Mallowan's memoirs adds flesh to the bare bones of archaeological reports: in addition to his description of the excavations he also describes 'dig life' and tells many amusing anecdotes about his colleagues. But the three chapters describing his wife's books seem rather superfluous; Agatha Christie needs no advertising, and his admiration and his devotion to her are implicit throughout the book wherever she is mentioned.

This book is of great interest to anyone concerned in the archaeology of the Near East, and should be read by those contemplating joining an excavation in that part of the world as well as by a more general public.

G. TALBOT

RAST, W. E. *Taanach I, Studies in the Iron Age pottery.* Edited by A. E. Glock. Cambridge, MA, American Schools of Oriental Research, 1978. xvi + 283 pp., 97 figs. $25.00.

The excavations of Tell Taannek, the site of the Biblical city of Taanach, were one of the major American archaeological enterprises in the Holy Land during the sixties. The excavations came to an end with the tragic death of the director, the late P. W. Lapp. However, thanks to Lapp's colleagues and students, the material from these excavations was not neglected. A. E. Glock took upon himself

the task of preparing the material for publication and editing the planned series of volumes, while the research of particular subjects is done by various scholars. This book, the first in the planned series, includes the study done by W. E. Rast on the Iron Age pottery from the Taanach excavations.

Most of the pottery published in this report originated in several buildings which can be dated either to the 12th century BC (Period I) or to the 10th century BC (Period II). The rest of the material, relating to Periods III–V (9th–8th centuries BC) is very poor, and includes no more than a handful of pottery sherds from obscure contexts. The pottery is arranged in the plates and discussed in the text according to architectural units: the pottery from each stratigraphic phase in each one of the buildings is published separately in full. This causes repetitions in the appearance of various forms both in the figures and in the discussion, yet enables the reader to have visual information on the full contents of each one of the Loci. This is a welcome approach to the publication of archaeological material, the only one which can provide objective examination of the material by the reader. The discussion in the text is limited to two subjects: the morphological development of profiles and surface treatment, and a wide-scale comparative analysis to finds in other sites. The stratigraphic difficulties in many of the major excavated sites led the author to choose some 'primary comparative loci' in other sites, which serve as the main comparative material to the finds from Taanach. The illustrations are arranged in a most original way: a photograph of each one of the samples accompanies the drawings in the same plate. This enables one to look at once at the drawings and photographs of the finds, an unusual feature in archaeological publications. Another invention, developed by A. E. Glock, is the most detailed description of the ware and surface treatment. This detailed description intends to give the reader maximum information on the clay, the non-plastics, the core and the surface treatment of each of the sherds. It is an admiring piece of work, the results of years of laborious work by A. E. and Lois Glock. Yet I wonder whether this system will be applied in other excavation reports, and whether the most detailed description can lead to any significant conclusions. Yet it is, by no means, an important contribution to the debated subject of the methodology of pottery publication.

The pottery of Period I (divided into two phases) is correctly dated to the 12th century BC. The types illustrate the transition from Late Bronze Age traditions into the new Iron Age traditions. Yet a comparison to the nearby site of Megiddo shows great differences: the decorated painted pottery of Megiddo Stratum VIIA is almost missing from Taanach. The range of types used in the 12th century houses at Taanach recalls Iron I Israelite settlement sites in Judah and Samaria (a very similar repertoire was found in the site of Gilo, south of Jerusalem, by the reviewer). This fact, unnoticed by the author, combines with the gap during the Late Bronze Age II and the fact that Period I houses are 'pillar houses', unknown in the Canaanite architecture yet well known in the Israelite architecture of the Iron Age, calls to question the main conclusion of the author, namely that Period I represents a Canaanite occupation. The material culture of this phase in Taanach is very different from the truly Canaanite character of contemporary Megiddo, and thus one has to ask whether this period does not represent an early Israelite occupation. Such a conclusion is, of course, difficult in the light of the mentioning of Taanach among the unconquered cities in the plain of Jezreel (Judges 1: 27), yet one should at least raise the possibility for such an interpretation.

The author suggests a gap of almost 100 years between Periods I and II. Such a gap may have really existed, since there is almost no material characteristic of Megiddo VIA. However, the great difference in the material culture between Megiddo and Taanach already in the 12th century may have continued during the 11th century, and thus it is probable to suggest that a poor settlement existed at the site during that period. At least part of the pottery of phase IIA should be dated to the 11th century, as noticed by the author. Since most of this pottery came from disturbed or insecure stratigraphic context, it may represent an occupation period which covers at least part of the proposed gap.

The richest and most well dated assemblage is the late 10th century group from the 'cult building', which joins other similar groups in establishing a secure departure point for pottery typology during this period. One of the characteristics of this group is the hand-burnished red slip. According to the author this technique was introduced during the time of King David as a result of northern (Aramean?) influence. However, it should be noticed that at Tell Qasile (near Tel-Aviv) hand-burnished red slip, with black painted decoration, appeared already in Stratum XI (*c.* 1110 BC) and continued to be common during Strata X–VIII. It is now clear that the technique was well known in Tell Qasile during the 11th century, while it probably spread to the north towards the beginning of the 10th century BC.

As remarked above, not much can be said on the pottery of Periods III–V. The poor material, mostly small sherds from unsecure loci, does not provide sufficient material for discussion. Period VI, the Persian Period, is represented by sherds found in stone-lined pits. Most of the material is homogeneous, yet it seems as if the author did not differentiate stray sherds which are evidently Iron Age in origin and were found in these pits (e.g. Fig. 82: 3, 5). Few correlations in the table at P. 56 are questionable. Thus Tell Qasile XII should be dated later than Megiddo VIIA; Tell Qasile X should be contemporary with Megiddo VIA while Megiddo III should probably be dated after the Assyrian conquest of 732 BC.

Some technical remarks should be made. Most archaeological reports on sites in the Levant contain drawings in a 1 : 5 scale. The publication of pottery in a 1 : 2.5 scale, as in the present book, not only wastes a lot of publication space but also cause difficulties in comparing the drawings to other publications. Another technical feature common in publications during the last 40 years is the marking of red slip by ruster. The omitting of this feature is a pity.

The publication of this volume still leaves important Iron Age material from Taanach unpublished. We look forward for the publication of the architecture and various other finds. However, this detailed, beautifully produced volume promise that the Taanach reports will become one of the major modern publications in the field of Biblical archaeology.

A. MAZAR

STEWART, H. M. *Egyptian stelae, reliefs and paintings from the Petrie Collection.* Part Two: *Archaic Period to Second Intermediate Period.* Warminster, Arrs & Phillips, 1979. viii + 44 pp., 41 pls. £15.00.

This is the second volume of the series of three illustrating all the pieces in the Petrie collection at University College London that fall under the general heading of stelae, reliefs and paintings. The introduction explains the purpose of the work and the period covered so that this need not be repeated here, suffice it to say that the material is arranged in chronological order. In all 165 items are covered including some offering tables. Useful indexes show the University College registration numbers against the serial numbers used in this catalogue, list kings in European nomenclature and private persons names under transliterated forms, as also titles. Divinities and provenances where known are also given.

As one would expect the drawings are excellent and of the highest order. In the plates line thickness is varied to indicate shadows of raised and sunk relief, and on occasion as with no. 79 a piece from the same monument now in another collection is included. Only a few photographs of some of the items are included and perhaps the main criticism of this work would be that this is not an invariable rule, or at least for the ones of importance, so that the reader would have a valuable guide for comparison when interpreting the inscriptions in the drawings. Dimensions of the pieces are given in the text as well as scales for the drawings so that one has a double indication of size and the amount of the monument that remains when it is very fragmentary.

One may remark on the wide range of inscriptions covered in this 1,500 year period although many, especially the early ones, are very fragmentary and thus not very informative although of some importance. Probably because of this the author adopts a cautious approach and thus for example no attempt is made to read the name or title on U.C.14277 a First dynasty courtier's stela. This is perhaps wise as any incomplete or suggested restoration is liable to much speculation and even argument and is in any case hardly certain. The writer could perhaps have indicated what some of the signs are in damaged names, i.e. an *m* in U.C.14276, etc. But these are minor omissions in an otherwise very thorough piece of inventory. It should be noted that some numbers do not appear to be illustrated presumably because they are already reproduced in the referenced works quoted or were deemed of insufficient importance, i.e. number 15.

Of particular interest to readers both Egyptological and those interested in general history and archaeology, should be the royal annal fragments from the Palermo Stone and the fragments of Teti and Pepi I pyramid texts.

But the author's technique really comes into its own with the illustrations of such tomb and temple scenes as the Fifth dynasty Tepemankh reliefs, or the Twelfth dynasty Koptos relief of Amenemhet I and his ka, U.C.14785. A piece from the Labyrinth temple at Hawara, no. 68, can now be compared much better with other items such as the lintel in the British Museum or the fragments in the Ashmolean than formerly, for these items lay scattered in Petrie's publications and were thus not featured items as here.

One hopes that the fresh publication of Seventeenth dynasty items from Koptos may stimulate some interest again by scholars in this little known period. Finally the delightful Eleventh dynasty stela fragments showing the owners and their pets are all reproduced here, and the puss correctly labelled which Petrie so unaccountably described as a 'dog'. The accompanying text refers to its master and mistress having a holiday and the whole thus provides a very human touch in showing what they hoped the world hereafter would be like, a life after death in which their pets also partook.

In conclusion there is a list of abbreviations and bibliography at the beginning, numerous references in the text and a complete breakdown as to material and form of the items. This is then a well produced and informative work and one looks forward to the final volume which will complete the series of valuable drawings and descriptions of a collection which has not hitherto been systematically studied.

E. P. UPHILL

VAN LOUN, Maurits (*ed.*). *Korucutepe; final report on the excavations of the Universities of Chicago, California (Los Angeles) and Amsterdam in the Keban Reservoir, Eastern Anatolia, 1968–70,* Vol. 3. Amsterdam–New York–Oxford, North-Holland Publishing Company, 1980. ix + 315 pp., 117 pls. $170.75.

This volume completes the publication of the 1968–70 excavations at Korucutepe in the Altinova near Elazig in eastern Turkey, and it deals with the later periods; the Second Millennium BC, the Early Iron Age, some Roman scraps and some fine Medieval pottery. Before 1968 the Second Millennium sequence of this area was only known from surface finds and the Early Iron Age *c.* 1200–800 BC was an unknown quantity. Now three sites, about three to four miles apart, Korucutepe, Tepecik and Norşuntepe have each yielded comparable sequences, but that from Korucutepe is the first to be published *in extenso,* Elizabeth E. Griffin dealing with the G–J phases of the Second Millennium and Milton M. Winn with the Early Iron Age pottery of phase K.

The ceramic development – there is little in the way of architecture except a city wall – is of considerable interest as we find ourselves here in Hurrian territory in ISUWA. Descended from a long Early Bronze Age tradition, new grey wheel-made wares appear in phase G (MB1) to be supplanted by orange burnished wares in H (MB2) when a few Central Anatolian shapes are adopted. Phase I (LB1), *c.* 1600–1400 BC, marks the long struggle between Hurrians and Hattians for supremacy, ending with Hittite conquest under a new and probably Hurrian dynasty. Phase J (LB2), 1400–1200 BC, sees the decline of pottery as mass production concentrates on a few shapes, both here and at Tarsus in Cilicia, also a Hurrian region. During the 13th century these new mass-produced drab wares also spread over the Hittite homeland, and not, as is argued here, vice versa. They also reached the Hittite province of North Syria. Moreover, after the breakdown of Hittite power *c.* 1200 BC, this wheel-made pottery continues to be made, in diminishing quantities, during the Early Iron Age (*c.* 1200–800 BC) side by side with new cream to buff slipped and burnished wares and burnished red and brown jars and cooking pots with grooved decoration, predominantly hand-made, coming from the East (Transcaucasia). Such a transition to the Iron Age during the 12th and 11th centuries has parallels elsewhere in Anatolia; e.g. at Troy and Larisa on the west coast, at Beycesultan and Gordion on the western plateau and at Tarsus in Cilicia, but is not yet documented in the Hittite homeland. In the east, it clearly led to the Middle Iron Age (*c.* 800–600), not documented at Korucutepe, but at the neighbouring site of Norşuntepe where a princely residence of the Urartian period was found, again with eastern pottery.

The material presented in this book is of considerable importance and in the Conclusion, pp. 271–7, Maurits van Loon presents a lucid *exposé* of the history of the site and its relations with its neighbours and reminds us that MASCA calibrated carbon dates alone agree with a historical chronology for this period. The treatment of the Second Millennium pottery is exhaustive and well documented, but without reading through the 57 pages, in small type, of the description of the strata it is virtually impossible to find out which particular pottery shape is in use in what period. Plates 4–6 present us with 405 different rim shapes in use during an 800 year period, alas not subdivided into phases G, H, I and J. To find out what assemblage follows what (and what it consists of), the reader is forced to make a labyrinthine Odyssey through the description of the strata; surely there must be easier ways of finding a needle in a haystack, such as one plate for each of the four assemblages?

JAMES MELLAART

TATTON-BROWN, V. (*ed.*). *Cyprus B.C.* London, British Museum Publications Ltd, 1979. 117 pp., 358 illus. (13 coloured). £6.95.

The catalogue of the exhibition 'Treasures of Cyprus' which has toured America, Europe and Britain is more than just a catalogue, since the finds described and illustrated here are taken largely from the more recent excavations in Cyprus. Thus the book gives not only a brief account of the history of Cyprus up until the Christian era as revealed through excavation but also includes a short history of archaeology in Cyprus dealing in particular with advances made during the last 15 years.

The map gives a good idea of the distribution of the sites on the island although it does not distinguish the periods covered by each of these sites. A brief survey of the Neolithic and Chalcolithic periods is sketched by Dr Peltenberg with particular reference to the sites whose excavation he is presently directing on the West Coast, to Lemba 'Lakkous', to Kissonerga 'Mosphilia' and 'Mylouthkia'. The Early and Middle Bronze Ages are similarly dealt with by Dr Swiny and the Late Bronze Age by Mrs Tatton-Brown and Dr Karageorghis, who also wrote the introduction. Particular reference is drawn to the sites of Enkomi, Kition, Palaepaphos by Dr Karageorghis and to Alaas by Mrs Tatton-Brown. Mrs Tatton-Brown describes the Geometric and Archaic periods noting the sites of Salamis, Ayia Irene and Meniko particularly, while Dr Karageorghis sketches the latter period at Kition. Various aspects of

Cypriote civilisation are dealt with: Dr Karageorghis notes the Cypro-Minoan script of the Late Bronze Age and Mrs Tatton-Brown surveys the writing, jewellery, sculpture and bronzes of the Archaic period. She includes a summary of the Classical period. All of this is illustrated with numerous black-and-white and some coloured photographs.

The book thus gives a short, somewhat sketchy account of the history of Cyprus up to the Christian era and, because of its nature, has much more relevance to the interested general public, the audience for which it was intended, than to the student taking his first steps in Cypriote archaeology.

M. L. G. MacLAURIN

Thera and the Aegean world I. Papers presented at the Second International Scientific Congress, Santorini, Greece, August 1978, edited by C. Doumas. London, 1978. 823 pp., 16 colour pls. and numerous illus. in the text. £32.00.

Thera and the Aegean world II. Papers and Proceedings, edited by C. Doumas, London, 1980. 427 pp., numerous illus. in text, geological map of Santorini. £32.00 (or £57.50 for the set of two volumes).

Thera, better known under its later name of Santorini, is the only active volcano in the Aegean. Geologists had long known and studied it ever since its pumice had been quarried in the last century to provide a cement to line the Suez Canal. Some Bronze Age finds had been made, and almost forgotten; they did however get into Perrot and Chipiez, *L'histoire de l'art dans l'Antiquité*. Then came Arthur Evans's discoveries of Knossos and its Minoan art, followed by numerous other excavations in Crete, but it was not till 1939 that S. Marinatos published a theory that the destruction and decline of Crete was due to the volcanic activity of Thera. On the beach at Amnisos, one of the harbours of Knossos, he had excavated a villa, some rooms of which had been filled at the time of its destruction by thick deposits of pumice and some of the walls, built of large stone blocks, bulged and were displaced as by the action of a suddenly retreating wave, the thing which happens when tsunamis hit a coast. Only in 1967 was he able to start work at Akrotiri on Thera; what he found there is common knowledge, a Late Bronze Age site covered by thick ash layers and volcanic bombs of an eruption now dated *c.* 1500 BC. The great argument then began; did the eruption (or successive eruptions) on Thera cause the damage in Crete or was this havoc caused by invading Mycenaeans? See the postscript in Volume II. The extraordinary nature of the site and the interest it aroused among geologists, geophysicists, palaeontologists and other practitioners in the natural sciences, apart from Aegean (and not a few other) archaeologists, led to the Congress of 1978, promptly published in these two splended volumes.

They contain 100 papers, plus the proceedings of a voluminous discussion, which more than anything else stresses the need for a multi-disciplinary approach to the excavations of great sites. What it also shows is that simple answers to complex problems rarely offer any hope of a solution. No straightforward answer to Marinatos's question raised in 1939 can yet be given. It would be invidious to comment on any of 100 papers; my advice to anyone interested in the subject of Thera and the Aegean world (or the East Mediterranean in general) is to read both volumes from cover to cover.

To P. Nomikos, the patron who made the Congress and its publication possible, to C. Doumas who edited the volumes, co-excavator with Marinatos and now director of excavations at Akrotiri, archaeologists owe a debt of gratitude. The printers also, G. Tsiveriotis Ltd in Athens, are to be congratulated on a job well done. Such high standards will be hard to emulate.

JAMES MELLAART

MACKENDRICK, P. *The North African stones speak.* London, Croom Helm, 1980. xv + 434 pp., illus. £10.95.

Professor Mackendrick sets out to write a cultural history by using archaeology, a method which inevitably has its limitations, but here succeeds very well. This is partially due to the scholarship put into the work and partially to the nature of the evidence: North Africa is exceptionally well blessed with Roman remains of all types and a wide variety of dates. The presence of town sites, rural sites and invaluable inscriptions dealing with farming practices make his task possible.

The book begins with a brief look at pre-Roman life, and then takes the reader through North Africa, country by country, from the first colony of Roman Africa to the Arab invasions. The conclusion apart, the book is almost a site index of the more important sites (concentrating for the most part on urban sites), and as such is useful to the general reader and the student alike, as it is the first such survey in English. The conclusion returns to the theme expressed in the introduction and a cultural pattern is formed from the evidence already stated.

My only criticism of the book is the author's preoccupation with modern politics; true, when dealing with an empire, in a world increasingly dominated by extremist politics, the imperialist's and communist's conflicting views on the subject are bound to influence any author, but I feel that this influence should be kept to a minimum. Roman politics are relevant, modern are not.

On a lighter note, the book mentions an interesting method for excavating a Roman temple, though it is not recommended – the use of dynamite!

R. K. FALKNER

FAGE, J. D. (*ed.*). *The Cambridge History of Africa.* Vol. 2. *From c. 500 B.C. to A.D. 1050.* Cambridge, Cambridge University Press, 1978; xvii + 840 pp., 64 figs., 38 pls. £30.00.

The format of the *Cambridge History* has long been estalished in English-speaking scholarly literature. It represents a remarkable and successful compromise between the great encyclopaedias and reference manuals of Continental scholarship, with their carefully integrated and disciplined contributions, and the more individualistic and eclectic scholarship of Britain and the United States. It was a product of its time. The original *Cambridge Modern History*, whose first volume appeared in 1902, had been planned by Lord Acton with a clear purpose: 'The aim of this work is to record, in the way most useful to the greatest number, the fullness of knowledge in the field of modern history which the nineteenth century has bequeathed to its successor'. The format, in which a college of distinguished editors planned the dozen or so volumes with chapters from named scholars judged to be foremost in their fields, was successfully transplanted into ancient history and medieval history, and later English literature. In recent years the format has been used for smaller compilations on regions (India, Poland, China and Iran), economic and religious history (Islam and Judaism).

The second volume of the *African History* covers a span of 1,500 years in that vast land. The limits have been chosen to take account of sources rather than particular events, from 500 BC when the Greek historian Herodotus provides our first written account of lands beyond Egypt until the middle of the 11th century when the western Muslim historian and geographer al-Bakri provides the first detailed picture of lands and people south of the Sahara. In between these two writers the north of the continent from Egypt to the Mahgreb saw the arrival of Phoenicians, Greeks and Romans, the Christian Roman Empire and the dramatic westward expansion of Islam in the 7th century.

No one can envy the task of Professor Fage in bringing to order the 11 chapters provided by his eight contributors: his own introduction to the volume is a most clear and helpful guide to the scope and argument of the contents. Would that the rest of the volume was so approachable. The texts of the chapters are for the most part devoid of annotation by footnotes, in itself not a bad thing. In place of footnotes the objects of the *Cambridge History* ought to have been better served than by rather breathless bibliographical essays followed by lists of modern works in alphabetical order. As a result, those footnotes which do appear are most beneficial. This is particularly true for those chapters where the material evidence is examined in detail (notably P. L. Shinnie in Chapter 4 on Meroe and Axum, and Chapter 9 on Christian Nubia; also W. H. C. Frend in Chapter 7 on Christian North Africa) and to which almost all of the 38 illustrations relate. Four chapters provide a narrative history of North Africa for the period of the volume, two by R. C. C. Law deal with classical antiquity (Chapters 2, 3) and two by Michael Brett with the Arab conquest and aftermath (Chapters 8, 9) that are linked by W. H. C. Frend on the Christian period (Chapter 7).

It is significant that the dates chosen to divide and to terminate the accounts of the classical period (323 BC – the death of Alexander the Great at Babylon – and AD 305 – the abdication of Diocletian at Nicomedia in Asia Minor) were in no way directly linked with the lands or peoples of Africa. Moreover it must be said that there is little of lasting value for this volume to be gained from a simple recapitulation of well-known stories in ancient history that relate to Africa. If the editor, as he seems to have done, asked for North Africa in antiquity described in 120 pages it would have been far better to relegate such matters as Punic and Roman civil wars to a few signposts (even a simple table of events) for guidance and tell more about Africa. And there is much to tell. Take the affair of Publius Sittius from Nuceria (near Naples), a friend of Sulla and Cicero, who fled Rome from debt first in 64 BC to Spain, then operated as a freelance mercenary commander in Africa, attacking Caesar's enemy Juba then mopping up Pompeian remnants after Thapsus in 46. His reward was his own little principality based on the Numidian fortress Cirta (the modern Constantine) which he proceeded to settle with his own soldiers and with friends brought over from Italy. Though murdered in 44 BC his followers (known as the Sittiani) were a lasting reminder for years of how the Roman Empire came to Africa – or at least to that little corner of it. Little or nothing is conveyed of this by the references to Sittius (pp. 187, 189 and 201) which give the facts but separately under different headings. The

chapter on the Hellenistic and Roman periods is in places rather dense and for most of the way is hard going. When space is short a well-chosen anecdote can often make a point succinctly. The Roman Empire in Africa gets only 18 pages but no space has been found for such stories as the Hippo dolphin. The Younger Pliny heard it over the dinner table and wrote it up in an elegant letter (ix, 33). A dolphin turned up at Hippo and became so tame that it gave rides to local children, and even came back after a silly deputy governor of the province poured scent over the poor creature in accordance with some superstitious mumbo-jumbo. Sadly the dolphin drew so many visitors that the local authorities destroyed it after protests from local citizens that their little town was losing its peace and quiet.

It would be unfortunate if this volume contributed to a belief that it is only in such areas as the Sahara or sub-Sahara that the study of African history is moving forward rapidly. In the Roman field there has appeared since this volume was written the remarkable book of Marcel Benabou, *La résistance africaine à la Romanisation* (Paris, 1976) which, apart from giving the best up-to-date military history of Roman North Africa, sets out the view that there was on the part of the native population a lasting cultural resistance towards Rome and that, as a result, Roman North Africa had much more of a particular identity than has traditionally been admitted (see the penetrating review by C. R. Whittaker in *Journal of Roman Studies*, lxviii, 1978: 190–2).

Perhaps the most enjoyable chapter to read is that by Raymond Mauny (Chapter 5) on trans-Saharan contacts, the coming of iron and food-production in West Africa. The Sorbonne emeritus keeps his story moving and the editor's translation has conveyed his crisp analysis and somewhat dogmatic style (though one does wonder if the label 'a nation of shopkeepers' (p. 297) was really what the French savant had in mind as a label for the Carthaginians). Nothing conveys better to the reader how much basic exploration there is to be done in these parts of the world than to discover that the postgraduate thesis of Patrick Munson from Illinois (then unpublished), describing his excavations in the neolithic villages of the Tichit-Walata escarpment in southern Mauritania (see plate 12), contains virtually all the archaeological evidence for early agriculture in West Africa (p. 304 ff.).

To conclude. What is the value of this tome, an expensive 840-page pudding of a book? Probably through an instinctive loyalty towards the Cambridge format the chapters on the best documented part of Africa, that is the north, have not been allowed to give support to those on other parts where the evidence in any form is much more meagre. If the narrative form had been set aside to form a mixture of more specialised regional and thematic studies then it ought to have been possible to have achieved the coherence that the editor appears to have been striving for. Planned in the mid-sixties the volume has appeared in the late seventies, and there have been many changes in the interval, not only in the field of African studies. The editor writes in his preface in early 1977 that starting over again they would have planned for a large number of more specialised, shorter chapters, each centred on a smaller area. That is hindsight. At the same time the editors and their publisher would have done well to consider the precedent of the revision of the *Cambridge Ancient History*, where accounts of the pre-classical have often to be revised in the light of new discoveries, first published chapter by chapter in fascicules. Cheap in the interim and surely not detrimental to a subsequent publication of the whole volume, to be welcomed as an already familiar tool of research and reference.

The reviewer wishes to offer his apologies for his delay in producing this review, which may appear an altogether unintended slight on this splendid achievement by Professor Fage and his collaborators.

J. J. WILKES

BERNAL, I. *A history of Mexican archaeology: the vanished civilizations of Middle America.* London, Thames & Hudson, 1980. 208 pp., 115 illus. £10.50.

In 1974 Willey and Sabloff wrote *A history of American archaeology*, a book which provided an excellent historical account of the development of archaeological theory and method in America. It naturally included accounts of some of the work done in Mexico because of the many American archaeologists who had worked in that country and developed many innovative ideas during this work. As this book was so recently written one might find it surprising that a book on the history of Mexican archaeology would need to be written now. But on the contrary, having read Willey and Sabloff, and now Bernal, it is evident that Ignacio Bernal's book is needed.

Bernal does not take the approach of Willey and Sabloff. Rather, he reviews 'the sequence of accretions to the store of knowledge [of Mexican archaeology] while at the same time giving some attention to those errors which often delay this process'. In other words, he reviews, historically, the rise of knowledge about the vanished civilisations of Mexico – and by necessity, Guatemala – and the history of the founding of some of the Mexican institutions and academies of anthropology and archaeology. It is a different but complementary approach to that of Willey and Sabloff.

Bernal divides his book into eight chapters, arranged chronologically from the European discovery of the Americas to 1950. He discusses the initial European reactions to the natives; the early accounts of the Spanish priests who learned much about the language and culture of the natives while converting them to Christianity; the usually erroneous, however well meaning, speculations of the enlightened European 'armchair' philosophers of the 18th century; the excellent descriptive reports of the European, Mexican and American explorers of the 19th century who rediscover the ancient Indian sites; what happened to the many artefacts which had been discovered in Mexico by the mid-nineteenth century and the events leading to the foundation of the Museo Nacional; and ends with a chapter reviewing the excavations of the early 20th century, and from which the full extent of the chronology of Mexican prehistory became understood and the many complex societies known. After 1950, advances in archaeological theory and method have been the means by which new interpretations have produced more information. Because Bernal did not wish to become involved in such a discussion (why should he when Willey and Sabloff have already done so, adequately), and because the fundamental basis of knowledge of Mexican prehistory was made by then, he finishes the book.

Despite the fact that Bernal has completed what he intended to do, the subject nature of the book is such that I cannot help but feel it to be incomplete. So many discoveries have been made since 1950 that it is unfortunate he could not have mentioned some of them without becoming involved in method and theory. More important, many discoveries made before 1950 only received but brief mention in the text. One such subject concerns the work conducted on the decipherment of the Mayan glyphs. The work of Forstemann and Seler are only briefly discussed, despite the importance of their work, just enough to make you want to know more. But the history of Mexican archaeology is now too vast for it to be told in any detail in a book of this type. Bernal's book should only be considered an introduction, but in writing it he has revealed that more detailed accounts of specific regions, specific groups and even Mexican epigraphy could and should be written. We certainly require a text on the history of Mayan archaeology. Therefore, in conclusion, because of its brevity Bernal's book can only be considered an introduction, but an indispensable one to any serious scholar of Mesoamerican archaeology. We now require more specific historical accounts to thoroughly understand the history of Mexican archaeology. This is a necessity because we can not really know where we are going unless we know where we have been.

W. B. M. WELSH

INGOLD, Tim. *Hunters, pastoralists and ranchers.* Cambridge, Cambridge University Press, 1980. 326 pp., illus. £12.50.

In recent years many British and American archaeologists have undertaken studies of contemporary reindeer societies in the hope that they will further our understanding of the hunter-gatherer societies of Upper Palaeolithic Europe. Tim Ingold's book is a salutory and persuasive reminder that such studies can only be of value if they are embedded in a theoretical framework that focuses on the interaction between social and ecological conditions.

Ingold has already published detailed accounts of his fieldwork among the Skolt Lapps. In this book he attempts a wide-ranging and ambitious study of the evolution of reindeer hunting, pastoral and ranching societies, drawing on a huge amount of ethnographic material. He suggests that neither the ecological reductionism of the Cambridge palaeo-economic 'school' nor the ecological functionalism of such writers as Barth or Leeds (or, indeed, Binford in his Nunamuit publications which unfortunately appeared too late to come under Ingold's scalpel) can explain the structure or the transformation of these different societies. Ingold criticises the assumption that the mode of subsistence structures the social organisation and that the latter is essentially 'adaptive' to ecological conditions and he notes the conflation or confusion of technical organisation with social organisation. He emphasises that although technical organisation may be constrained by ecological conditions, it is dominated by the larger system of social relations. Hunters, pastoralists and ranchers all depend on the reindeer herds and may use many similar techniques, yet all three are distinguished by very different property relations that structure the relations between individuals and between individuals and the herds. The hunter has free access to the herds, the pastoralist and rancher have limited access. Free access requires reciprocity and militates against accumulation. Limited access requires social and economic divisions, and independent accumulation against hard times. The strategies that evolve are about maintaining and reproducing these different social relations of production, not about adaptiveness to natural conditions; indeed, as Ingold forcefully shows, pastoralism and ranching are intrinsically maladaptive, for accumulation must eventually lead to overstocking of the available pastures.

Whilst one might disagree with some of Ingold's rather idiosyncratic Marxist formulations (there are, for example, altogether too many modes of production), he offers a very interesting and detailed analysis of the structure of the different reindeer-based societies. He is less convincing in his

more sweeping theories of agricultural origins or of a great chain of diffusion supposedly linking the pastoralism of the Central Asian steppes with the domestic reindeer herds of the tundra.

This is a rare book that should convince archaeologists that they cannot remain in their techno-environmental holes but must take a look at the wider social horizons, and at what anthropologists have to offer, not only in the way of ethnographic material, but, more importantly, in terms of social theory.

BARBARA BENDER

HAYDEN, B. *Palaeolithic reflections: lithic technology and ethnographic excavations among Australian aborigines.* Canberra, Australian Institute of Aboriginal Studies, 1979. viii + 181 pp., 39 figs., 31 pls. A$16.25.

This book appears to have two aims. One is to present some detailed time and motion studies of how Australian Western Desert aborigines made and used stone tools for a series of woodworking experiments requested by the author. The second aim is to suggest that such data have general applicability to the Palaeolithic elsewhere in the world.

The data chapters will probably contain information of use to specialists of the region concerned; to all other readers they will be almost indigestible. Hayden discusses tool types and manufacturing methods (surely now of dubious value since the aborigines concerned actually stopped making stone tools 25–30 years ago), and describes the manufacture of various wooden items and the resulting use-wear on the tools. He also carried out two excavations on recent and remembered campsites to see how the archaeology fitted the memory. The results seem to me to be particularistic and not amenable to any generalisation of broad applicability, although Hayden does cap his conclusions with a suggestion that Acheulian handaxes were used for woodworking and not butchering. This book may prove a useful mine of information for research on stone tool use in prehistoric Australia, and the detail of the recording is certainly impressive.

P. BELLWOOD

FRISON, G. C. *Prehistoric hunters of the High Plains* (New World Archaeological Record). London, Academic Press, 1978. xiv + 457 pp., illus. £19.15.

For the student of North American Plains prehistory and the general reader George C. Frison's book *Prehistoric hunters of the High Plains* provides an interesting synthesis of data derived from many different disciplines. Among the topics covered in this book are the cultural chronology, hunting and butchering patterns and techniques, the functional aspects of prehistoric hunting implements, animal ecology and behaviour, and the physical environment of the north-western Plains. In the presentation of this material good use is made of numerous photographs and drawings.

Frison gives a thorough presentation of the archaeological record from the Paleo-Indian period to historic times. In his discussion of the various north-west Plains cultures he describes several sites for each cultural period: Paleo-Indian, Early, Middle, and Late Plains Archaic, and Late Prehistoric. For each site he presents information concerning the site's geology, present environment, stratigraphy, artefacts, and faunal remains. In the illustrations of the stone and bone artefacts it is good to see other tool types (e.g. scrapers, piercers, 'knives', and bone 'fleshers') which are components of the tool kits along with the projectile points.

The chapters on butchering and processing of animal products and the functional aspects of hunting implements demonstrate the importance of experiments in replication and use of artefacts to prehistoric archaeology. Many problems concerning prehistoric butchering techniques or the wear and damage to stone and bone artefacts can be understood by comparing experimental data to the archaeological evidence.

In his discussion of the various types of animal jumps and traps, Frison points out that the prehistoric hunter used information regarding local terrain and the natural behaviour patterns of the animal being hunted. He shows that a similar understanding of local geomorphology and animal behaviour is important to the archaeologist in his interpretation of the events at a 'kill' site. Particularly impressive are the aerial photographs of the drive lanes, jumps, and traps some of which extend for several miles and terminate at bluffs, arroyos, or in one case a sinkhole.

Misprints and other printing and layout mistakes are few (Fig. 2.24 which is a photograph of a toothed metatarsal flesher is cut off at its base) and the overall impression to this reviewer was good.

C. A. BERGMAN

SPIESS, A. E. *Reindeer and caribou hunters: an archaeological study* (Studies in Archaeology). London, Academic Press, 1979. xiii + 312 pp., illus. £14.60.

(Reindeer and caribou being *Rangifer tarandus*, the same species.)

It is perhaps appropriate that the reviewer of this book on reindeer is no palaeontologist. Neither, strictly speaking, is the author. The author is an archaeologist with a special interest in palaeontology and in all the ethnological, climatological and environmental factors that impinge on it. The scope is vast and is of the kind that some arcaheologists dream of attempting at the end of their career, or if they were L. Binford. Spiess, necessarily, neglects a great deal and leaves himself open to criticism on all sides. Nevertheless, the work is unpretentious and careful. It is one of the few attempts to apply recent, non-French, hypotheses on human behaviour and refined palaeontological techniques to French palaeolithic archaeology, Abri Pataud in this case.

The Studies in Archaeology series of the Academic Press has the feature of frequent headings and sub-headings, an ideal arrangement for readers who want to skim. This book conforms to that pattern, and since it seems to be an abridged and edited Ph.D. thesis, it has more information than usual under each heading. The short introduction tells how the author coped with the present state of archaeology in general and with specific theories of human behaviour *vis-à-vis* archaeology. The first section documents modern reindeer biology and behaviour and modern man's association with reindeer: seasonal and long-term demography, hunting techniques and equipment, and the uses to which reindeer are put. The second section is devoted to the archaeology of reindeer hunters. Spiess examines four fairly recent inland Eskimo sites from northern Alaska and one coastal Eskimo site from Labrador. Then, using the same techniques, he compares the results to Abri Pataud. The methods he uses are traditional, with the addition of a new tooth-sectioning technique, and his particular contribution comes from defining the boundaries of the data. For example, he acknowledges the greater experience of Bouchud with bones and with Abri Pataud. At the same time he dismantles the framework for citing antler as evidence of year-round occupation of a site. Movius (p. 204) appears to favour Bouchud's year-round habitation theory, and even while Spiess marshals all his evidence to show that Abri Pataud was occupied only during late autumn, winter and early spring, he provides the reader with enough information for a counter-argument. Spiess ignores the possibilities for use of other fresh meat (chamois? pig?), dried meat, vegetable matter, birds, salmon and other fish, but he tells why he ignores them. Despite the fact that Spiess addresses the questions of prehistoric herd size, composition and behaviour in relation to the archaeological features at Abri Pataud, one has the feeling that an even finer resolution would have been possible if he had been present during the excavations.

Spiess admits that Movius was only moderately successful in teaching him palaeolithic archaeology, and, perhaps, he is right. It is disconcerting in an archaeological study to have an Ingalik ground stone nub called a 'burin' (p. 14); still more, to know certainly that the wooden object from Claxton [*sic*] is a spear (p. 136). In addition, Spiess makes the unfortunate assumption that the rate of deposition of stone objects on a site is simply correlated to time (e.g. p. 164).

In fact, this study is not about material culture, and it is a major advance in archaeological literature to have reference to any stone tools in a book concerned with animals.

There are too many typographical errors in the book; for example, the title of the graph on p. 81 is printed upside down. Nevertheless, the book is specific, as opposed to theoretical, well written, and any archaeologist who has anything to do with reindeer will probably be filled with hope and some new ideas upon reading it.

EMILY H. MOSS

AVRAHAMI, D. *Eskimo and N.W. Indian art at the National Maritime Museum, Haifa.* Haifa, National Maritime Museum Foundation, 1979. 72 pp., 96 illus. Hebrew and English text. n.p.

This publication is a pictorial catalogue of Eskimo and north-west coast Indian art and utensils donated to the National Maritime Museum in Haifa, Israel. The presentation is divided into two sections corresponding to the artefacts of both groups. Brief discussions of the geography, history, aesthetic philosophy and mythology of the two people precedes the photographs of their handicrafts. These discussions provide useful background information and appear in both Hebrew and English. Since the English sections accompany the Hebrew the pages are turned left to right which is confusing for the unaccustomed reader. Why not separate the two languages as is done in most books and journals printed in both a European language and Hebrew or Arabic?

The art objects, photographed mainly in black and white, cover a wide range of media and motifs. Each photograph is accompanied by a brief description giving relevant details such as material and size. Among the collection of Eskimo artwork are carvings in bone, ivory and antler of deities,

men and animals. The Eskimos, intimately acquainted with their fellow creatures, were able to sculpt life-like images of animals. Among the beautiful examples illustrated are a seal (p. 20, pl. 10) which is mistakenly labelled as a bird, a bear (p. 28, pl. 33) that is only 2.9 cm long and 1 cm high, and a husky dog (p. 29, pl. 35). The north-west Indian art objects differ from those of the Eskimo in two ways: first, the medium used is wood, and second the animals which are portrayed are depicted as abstract, symbolic forms. Compare the bear on p. 67 with those made by the Eskimos on pp. 28–9.

The other objects which appear in this book are of a more utilitarian nature in that they are tools intended for use. Among these are Eskimo snow-goggles, harpoons, and mooring hooks. Typical of the north-west Indians are the fish hooks made of wood, rope and fibre with bone barbs. Two examples are made of wood which has been softened by steam and then shaped. The rest are carved wood, often with elaborate designs.

Although this publication deals with a limited collection it does succeed in giving the reader a general idea about Eskimo and north-west Indian art. It provides a brief glimpse of two native North American people's view of the world and its reflection in their art.

C. A. BERGMAN

LEE, Richard Borshay. *The !Kung San: men, women and work in a foraging society.* New York: Cambridge University Press, 1979. xxv + 526 pp., 5 appendices + bibliography, 109 tables, 29 figs. £22.50; paperback £7.95.

Richard Lee has written several articles and essays on the !Kung San the past 12 years, but there has never appeared a unified account of his fieldwork. This book provides just such an account and although many anthropologists and archaeologists may have waited impatiently for its appearance this account leaves nothing out and is well worth the wait.

The book is set out in 15 chapters with an introduction and five appendices. The introduction provides an indication of the theory and method underlining Lee's work – cultural ecology, French Marxism, and systems theory – and the aims of the fieldwork. In Chapter 1 we are given a brief history of the fieldwork and the chapter is interspersed with some rather humorous anecdotes. The second chapter introduces the major language and cultural divisions of the San, provides an explanation of the author's preference for referring to them as San rather than the hitherto more popular term – in fact, it is a derogatory term – Bushmen, and the author delineates who precisely the !Kung San are in relation to the San as a whole. The !Kung are one of the three main language groupings of the Kalahari San. Chapter 3 presents an analysis of the numbers and distribution of the !Kung camp locations, and an assessment of the effect of European and non-San populations on the settlement, seasonal movement, and political organisation of the !Kung in the past 100 years. The fourth chapter gives a description of the environment of the !Kung, as the author perceived it and as perceived by the !Kung – an etic and emic approach.

The next four chapters – 5–8 – provide a basic description of their hunting and gathering existence. Chapter 5 defines the main characteristics of a hunting and gathering economy, and Lee provides a thorough examination and description of their material culture with some emphasis on the use of carrying devices and their role in the economy. Chapter 6 provides an inventory of the plant resources utilised by the !Kung, and a hierarchical classification of plants based on desirability is presented. What constitutes the desirability of a plant is fully explained. The next chapter is a detailed study of the most desired of all plants, the mongongo. We discover its distribution in relation to their camps, how the !Kung collect it, process it, and eat it, and its nutritional value. The eighth chapter is a description of hunting techniques interspersed with tales of individual hunts and, interestingly, methods of preventing good hunters from becoming too boastful. These four chapters are a very important part of the text as the author clearly indicates the relative importance of plant collecting and hunting in relation to time, nutrition, and socia' and ritual value. This is very useful to any ethnoarchaeologists attempting to provide possible reconstructions of behaviour and activities from the material remains of a prehistoric hunting and gathering population. Lee provides us with information that will not be entirely evident in a strictly archaeological context and would therefore be useful in providing alternative interpretations.

Chapters 9–11 concern special problems of existence in a hunting and gathering subsistence. Chapter 9 presents an examination of work effort and the caloric and nutritional returns from food in relation to this work. Three kinds of work are identified and Lee compares the amount of time men work in relation to women to determine who works the most efficiently. The tenth chapter examines the question of whether the !Kung suffer from any nutritional stress, and the eleventh chapter is a very good examination of !Kung fertility. This chapter is very important as the observations and many of the conclusions bear directly upon explanations of trends of prehistoric demography.

Chapter 12 examines the question of ownership, especially land-ownership, leadership, territoriality, and the use of space in !Kung society. The author is particularly concerned with how the !Kung establish their less than rigid land boundaries and land ownership between the various camps. The thirteenth chapter is a very comprehensive account of conflict and violence among the !Kung since 1920 and the fourteenth is a consideration of the economic and social changes occurring in their society as a result of European and Bantu pastoralist influence. The last chapter presents the major results of the study and why the author considers the Marxist, cultural, ecological, systems theory and uniformitarian combination of approaches the best method of obtaining the results. Lastly, the author provides short appendices which present a review of the population of the Dobe area !Kung, a list of the plants of the area, mammals regularly hunted in the area, nutritional value of the major foods, and a short essay on the importance of carrying devices in human evolution, respectively.

This book then provides a thorough presentation of a hunting and gathering society, an urgently required presentation because their existence as hunter-gatherers is slowly being altered through external influences. It is one of the best accounts of a hunting and gathering society regardless of whether you agree with the author's methodological approach. His conclusions are well considered and presented in a fashion where the reader clearly sees which observations and information led to a particular conclusion. It is well written, not in an overtly Marxist fashion, free of jargon, and the frequent presentation of interesting and unusual facts and anecdotes make the book easy to read and often very amusing. Most important, although this book may be of crucial importance to both anthropologists and archaeologists, especially those interested in the application of ethnographic interpretations to prehistoric populations, this book has been written in a manner where it can be easily read by the layman. Many of us in specialised professions forget that we have a responsibility to share our knowledge and information with the general public. This does require a special and patient approach and Lee has produced it here. Make no mistake, this is indeed a very well-written and important account of a now unique population and a vanishing way of life, and regardless of the price, it should not be missed by anyone.

W. B. M. WELSH

ARNOLD, J. Barto III and WEDDLE, Robert S. *The Spanish shipwrecks of 1554: the nautical archaeology of Padre Island* (Studies in Archaeology). London, Academic Press, 1978. 462 pp., 91 figs. £22.10.

As the title suggests, the *raison d'être* of this lavishly produced book is the wrecking off Padre Island on the Texas Gulf coast in 1554 of three Spanish ships, the *San Esteban, Santa María de Yciar* and *Espíritu Santo,* laden with bullion and other Indies produce. Some of the archaeology of the area has received earlier coverage (D. L. Olds, *Texas legacy from the Gulf: a report on sixteenth century shipwreck material recovered from the Texas tidelands,* 1976, reviewed *IJNA,* 8, 1979: 354), but this book presents the results of recent disciplined research and archaeological investigation, dividing the material into two parts: a (frequently gripping) history (R.S.W.), and a detailed report of the archaeological work from 1972 to 1975 (J.B.A.).

Weddle's approach is to give an extensive and broad historical survey not only of the immediate tragedy, but also the context of the period – its politics, the effects of New World trade on Europe's economy, the (appalling) conduct of trade and navigation, and the impact of the loss on the Spanish economy. Part I, 'The Great Lottery', runs through the chances of success or failure on such a voyage, the hazards (primitive navigation, natural elements, French corsairs), and the events subsequent to the wrecking when those lucky enough to reach the shore were attacked by natives who decimated them on their miserable march through dunes and marshes to Pánuce. The narratives of contemporaries and survivors combine with the appearance of colourful characters like the French corsair *Pie de Pale* (Pegleg), and a discussion of the Spanish coinage system. Part II illustrates the complex nature of the age and the factors that contributed to the disaster. The working of the *Casa de Contratación,* the payment of *avería* (protection money) and the calculation of tunnage also receive attention. Part III, 'Catalyst to Disaster' plots the episode's implications and how Charles V's financial demands for the wars of Spain and Empire stifled the country's economy, the loss precipitated financial havoc and salvage operations immediately commenced.

The archaeological section covers the logistical aspects, planning and preparation (management data), along with the initial site/area surveys (magnetometer underwater, and land survey of the survivors' salvage camp), archival research and site plans. The bulk of the report is formed by the artefact catalogue, sensibly arranged by material. All are very well illustrated by photographs and/or line drawings, and X-rays of concreted finds were used to provide excellent illustrations of artefact associations before retrieval. Appendices include an archival summary of the cargo register of *Santa María de Yciar,* condensed artefact inventories, and reports on benthic organisms, fibres, fossil cockroaches and conservation procedures.

The standard of illustration is extremely high, and lengthy captions offer a useful supplement to the (at times brief) text. Perhaps more emphasis should have been given to the pitfalls of calculating vessel dimensions, as on the basis of a very small section of keel and sternpost an entire ship is reconstructed by one consultant, while a second, using similar sources but different timber dimensions, postulates a very different size. The fact that these independant calculations vary receives some acknowledgement, but not enough stress is laid on the variables concerned: that shipwrights may have been illiterate, let alone able to practise geometrical theorems, that English rules for the calculation of uncertain date differed from the Mediterranean. The most detailed illustration of the timbers in question mislabels stemknee 'keelson' and lacks the forward knee bolt shown in the second diagram, while a top view would have been useful. Although some structural elements were found, no dimensions are given, and it is unclear which are represented by the samples in Table 3. No profiles illustrate the site stratigraphy and the first half of the book with its crop of place names would have meant more accompanied by a modern map of the areas involved. Were the book not clearly divided into two distinct sections, no doubt the historical minutiae of, for example, the disposition of religious communities in the 16th century, would appear to the archaeologist a peripheral, if not tedious catalogue of events and places, adding little to the interpretation of the site. Seen as two separate but complementary contributions, however, to the archaeology of 16th century maritime archaeology, they form an extremely useful monograph, and while publication as two (cheaper) reports may appear more suited for the specialist, their appearance together will compel many readers (I hope), to wander fields otherwise untrod, and benefit from the experience.

MARK REDKNAP

REYNOLDS, Peter J. *Iron-age farm, the Butser experiment.* London, British Museum Publications, 1979. 112 pp., illus. £5.95, paperback £2.95.

The Butser Iron Age farm experiment has aroused much interest in the last few years, not only among environmental archaeologists and those interested in the practicalities of house reconstruction, but also the lay fraternity in archaeology. The publication of this compact, well-illustrated book cataloguing the interim results of the experiments should become an addition to any archaeologist's bookshelf. The only omission is a bibliography, which would have been welcome, as I am sure all readers will be inspired to follow up some of the subjects discussed.

The intention of the project was to reconstruct a farm dating from 300 BC, representative of the central epoch of the Iron Age and to explore all the aspects of such a farm; structures, plant cultivation and animal husbandry. Clearly such a large open air laboratory can make a great contribution to archaeological interpretation.

Perhaps one of the most interesting aspects has been the work on crop cultivation and the process of how evidence on the economy becomes incorporated in the archaeological record. As so much of the research on prehistoric economies comes from small samples of carbonised seeds and plant material, the work can shed much light on the validity or otherwise of previous assumptions and studies. One cautionary observation, for example, is that many of the carbonised samples could easily be from bonfires in the farmyard to clear away weeds at the end of the harvest.

Experimental archaeology in all branches of the discipline plays a vital role in providing empirical tests on hypotheses and it is to be hoped that the success of the Butser farm will inspire other projects in the future. Peter Reynolds and the Butser project team can be congratulated on their tenacity and persistence in continuing to obtain funding under today's difficult circumstances.

The nature of this report, published after six years, represents already a wealth of experience and gives testimonial to the techniques and data retrieval systems of the various experiments. It is to be hoped that further instalments of the results of these long-running projects will appear in an equally well-presented form.

GILL TAYLOR

GOULD, R. A. *Living Archaeology* (New Studies in Archaeology). Cambridge, Cambridge University Press, 1980. xv + 270 pp., illus. £15.00, paperback £4.95.

This book is partly an advertisement for what is heralded as a new approach in archaeology. Like all new approaches, I doubt whether this one has a very broad future, but Gould at least gives the reader an interesting and lucid text on the Australian aborigines, which in itself will be of value to archaeologists working in this part of the world.

Let us begin with the new approach. Gould proposes 'living archaeology' as the active mode of ethno-archaeology, and suggests that 'uniformitarianist kinds of generalisations about human behaviour' can be derived from studies of living societies which stress relationships between human behaviour and residue formation, an approach naturally neglected in standard ethnographies. Gould takes some pains to stress the dangers of arguing from ethnographic analogy to interpret the past, and feels that little can be achieved by applying deductive methods of hypothesis testing directly to the archaeological record. He prefers to argue by 'anomaly', directly from an ethnographic base and back into the archaeological record. I personally found it hard to decide whether Gould's method of argument by anomaly is not simply an oblique way of arguing by analogy, but this is not a major issue.

The thread of the book follows a clear logical course. After an introduction, he goes on to describe an Australian Western Desert community who live in a highly stressful environment, and shows how they need to be acquainted with a very large territory and to maintain broad-ranging social ties with other groups in order to have access to resources when faced by drought or other disasters. This is sound adaptation through a process of risk minimisation by a society which does not store food. Basically, the 'signature' for this particular type of desert adaptation is widespread inter-group contact and environmental knowledge, and Gould goes on to identify this pattern in a nearby archaeological site (Puntutjarpa) by means of an anomaly. Throughout the 10,000 year sequence here, people were using exotic but poor quality stones for tools in some quantity; there is no technological answer for this (the local stone is better), so Gould sees it as part of a strategy to maintain long-range social and environmental lifelines.

This kind of argument, from ethnographic stress signature via archaeological anomaly to archaeological explanation, is intriguing and doubtless has logical merit. Gould also discusses (but does not explain) certain other Australian anomalies; the biased geographical distribution of Mount William axes, the Tasmanian halt to all fishing around 3,800 BP, and the lack of use of the dingo for hunting. Could these be signatures for other kinds of adaptations?

The question at issue is whether 'uniformitarianist kinds of generalisations' can ever be derived which will have universal application to the archaeological record, or whether the signatures, which are clearly laborious to identify, will be of only local validity. It is up to 'living archaeology' to provide the answers.

P. BELLWOOD

MUCKELROY, Keith (*ed.*). *Archaeology under water: an atlas of the world's submerged sites.* New York and London, McGraw-Hill Book Company, 1980. 192 pp., illus. £9.95.

In Keith Muckelroy's previous book *Maritime archaeology* he described the relationship between maritime, underwater and nautical archaeology. In this book he has reviewed the second of these disciplines since the beginning of the subject some 30 years ago. He also attempts to set underwater archaeology within the larger framework of archaeology itself, and to justify it as an academic discipline, since it has not yet been universally accepted as such.

The book takes the form of an atlas composed of sections by some of the leading underwater archaeologists and covering sites from every part of the world, dating from the Pleistocene to the 17th century. Although it is so comprehensive, it is also remarkably detailed for a book of this size, and can therefore serve both as an introduction to the subject and as informative reading material for anyone already involved in underwater archaeology.

As well as discussing the results from underwater archaeology, the techniques used in surveying, excavating and conserving wrecks are discussed both in the general chapters and also within the inidividual sections on particular sites. In addition, the legal position of underwater sites is summarised as a final section by Muckelroy himself.

Although the main emphasis is on wrecks and maritime archaeology, one of the chapters includes sections on settlements now under water, ranging from 11,000-year-old palaeo-Indian hunting camps off American coasts to the city of Port Royal submerged during an earthquake in 1692.

Throughout the book the importance of context and information rather than finds is stressed; maps, plans and reconstructions of the sites are illustrated more often than spectacular finds. Nevertheless 'treasure' has not been entirely excluded and the book will therefore interest those with a more traditional view of ancient wrecks, as well as those with an academic approach to underwater archaeology.

JUDY STOKES

Man before metals. London, British Museum Publications, 1979. 32 pp., 4 maps, 23 pls. £1.25.

This small pamphlet, intended to accompany an exhibit entitled 'Man before metals' on display at the British Museum, provides a general outline of man's physical and cultural development over the past three million years. As such it is intended primarily for the museum visitor with a general knowledge of man's past. Beginning with the earliest hominid remains and their associated artefacts, the reader progresses through the biological, cultural and technological development of man. Good use is made of maps, drawings and photographs illustrating site distribution, artefacts and their manufacture and important archaeological sites. A glossary is provided at the back (pp. 31–2) explaining some of the terms which appear in the text. This pamphlet will undoubtedly enhance a visit to 'Man before metals'.

C. A. BERGMAN

DEVER, W. G. and LANCE, H. D. (*eds*). *A manual of field excavation: handbook for field archaeologists.* Cincinnati and Jerusalem, Hebrew Union College, 1978. iv + 240 pp., illus. $10.00.

In consideration of this book a number of important factors should be borne in mind. First, note should be taken of the 'self-imposed limitations' (p. i) of the editors, namely, that it is a practical handbook, not a book of general theory, and that it is specifically designed to deal with problems arising in the archaeology of the Levant. Second, it should be noted that the text as presented here is basically of 1967 vintage, updated to 1972–3, although it did not actually reach print until 1978; thus it, understandably, makes no references to developments in the various aspects of fieldwork dealt with which have occurred since 1972–3 (cf. Barker, P. A., *Techniques of archaeological excavation,* London, Batsford, 1977). Finally, the format of a collection of separately written articles by different authors has obvious strengths and weaknesses which need not be further elaborated.

In Chapter I, introduction and subsection A (pp. 6–7), the Principles of Excavation, and Procedures of Field Excavation, it is interesting to note that the arrangement of excavation areas in the 'grid' system could have been taken straight from *Archaeology from the earth* (Wheeler, 1954: 81–6), and seems to take no real account of the criticisms of this method and changes in working practices introduced as a result, within the system of close and detailed stratigraphic control, as far back as the 1950s in British archaeology (see the discussion in Barker, P. A., *Techniques of archaeological excavation,* London, Batsford, 1977, for a concise summary not available to the authors and editors of the book under review here at their time of writing). If this handbook is designed to be studied by potential staff *before* going on an excavation, it might also have been helpful to include a list of some of the other books, articles, and essays on excavation technique available when it was last revised as background reading. Perhaps the failure to do this is due to the origin of this book as the handbook for the Gezer excavations, the primary purpose of which is to state the system adopted on that excavation and not to discuss the relative merits of alternative systems. Here, as in Chapter IV, it is worth keeping in mind that the system set out here was designed for the excavations at Gezer, and that it would not necessarily be the best system for another site.

Chapters II, on Archaeological Tools and Their Use, and III, on Balks: Their Care and Reading, are of particular value in a manual of this kind, and are an important contribution in this context, as Chapter II in particular has few exact parallels in the existing literature. Chapter IV, the Field Recording System, is of major importance, both in itself, and for the light which it sheds on the meaning of the units recorded in the first two volumes of the Gezer final reports, in which the precise relationship between the locus and the basket is not made altogether clear to those not used to this system. Clearly this aspect of the Gezer system, as outlined on pages 78–80, has distinct advantages; however, it must be pointed out that it also has the disadvantage of adding yet another number to the sequence of identifying numbers attached to any artefact. This inevitably introduces another possible source of mismarking, an event which occasionally occurs in spite of the most stringent precautions in the course of any processing effort. The forms used in the field notebooks are of particular interest, and may be favourably compared with those used at Beersheba (Aharoni, Y. *et al., Beersheba I,* Tel Aviv, 1973), which do not provide for such precise control in excavation, observation, or recording. It would be most illuminating to see undertaken a comparative study of such forms and recording systems from the excavations in the Near East and other areas such as Britain and the United States which use them. Such a study would, through a broader range of comparisons, allow for greater refinements in order to fit the forms more closely to the materials being studied. Chapter V, which deals with the system of handling the pottery, is also of value, providing as it does a successful alternative to the systems used on many excavations. (Success in this context being taken to mean capacity to deal with the material

quickly and accurately.) It does also illustrate, once again, the enormous advantages of having a permanent base and processing staff in the country of excavation; advantages all too often unavailable due to limited financial resources.

In Chapter VI, Field Surveying and Drafting for the Archaeologist, Part II, Sections A and B, which deal primarily with the aims and staffing for architectural recording, also provide an excellent critical statement of the relative importance of this aspect of the greater problem of field recording, which should be noted in the continuing debate on the relative value of different recording techniques.

Oddly enough, the photographs in Chapter VII, on Archaeological Photography, all seem to suffer from more faults than some of them are meant to illustrate, and fall below the generally high standard of those in the rest of the book and in the other Gezer publications.

Chapter VIII amply illustrates the possibilities of the full use of geological studies in an excavation. In particular section VI summarising the results of a study of the geological provenance of materials used in the manufacture of pottery and other clay items, could be most useful in identifying centres of manufacture of pottery within Palestine, and in clarifying the degree to which Palestinian pottery was locally or centrally made.

As has been pointed out elsewhere (Matthers, J., review in *Palestine Exploration Quarterly*, January–June 1980: 63–4), it would perhaps have improved the coverage of the book, and its instructional value, to have included chapters on some of the other specialist studies of major importance, and more extensive treatment of conservation and sampling techniques.

If the above comments have seemed somewhat negative, this must not be taken as the final judgement on a valuable contribution well produced. It is worth noting that this is the first such manual, dealing with modern stratigraphic excavation techniques, specifically designed with conditions in the Levant in mind, to appear. As such it is long overdue. In a book designed to be taken into the field and used one may also be thankful for both the quality of the binding (with pages bound in properly sewn sections, rather than cut-and-glued), and its relatively low cost, a rarity in recent times. It is a book which can be of great value, both to the beginner and the experienced archaeologist working in the Levant, and which will generously repay a careful study.

RUPERT CHAPMAN

FARRAR, R. *Survey by prismatic compass.* London, Council for British Archaeology, 1980. 15 pp., 2 figs.

After initial surprise that anything new remained to be said about compass surveying, the fact that it is published in the present economic straits raises one's expectations. The author's case is that existing manuals for the beginner concentrate on the surveying of small sites at large scales, and ignore large, complex sites with steep gradients and other obstacles. Decrying the 'mystique' that such sites are the province of the professional surveyor, Farrar attempts to bypass the difficulties on the premise that they have largely been solved by the Ordnance Survey, and that all additions and modifications need only be related to control points identified on a large-scale map. The idea – in Britain at least – is useful, although hardly novel. It is, however, in its application that he goes astray. Having located such a control point, he proceeds by traverse along the archaeological feature itself, 'bearings and measurements being taken between canes set up as closely together as is needful to express sensitively its curves and angles'. Supplemented by offset measurements the results are then plotted by scale and protractor.

The weakness of this procedure is so clearly revealed in his example (Fig. 2) that one might think it had been devised for the purpose. The illustration shows a gently curved portion of a bank about 60 m in length, which is planned by means of a 13-legged traverse along its crest, most of the legs measuring less than 5 m. While it is true that in theory the errors in bearing of a compass traverse are not cumulative, the re-centring of the protractor so many times in a short distance is hazardous and unnecessary. As a general rule 'the legs in the traverse must be sufficiently long to reduce the effects of centring' (Bannister, A. and Raymond, S., *Surveying*, 194, Pitman). In the case illustrated the number of legs could be reduced to two, if one *had* to traverse along the crest. Otherwise, the latter could be plotted by radial measurements from a single point without involving any taped distance greater than 30 m.

Regarding the writer's further claim to dispense with base-lines and field geometry, this would be feasible only where the map provided control points in sufficient concentration. In any case why dispense with anything that might be useful?

It is a pity that this pamphlet, in some ways carefully researched, should be vitiated by the misuse of techniques which, wisely applied, would be of value – as they have long been.

H. M. STEWART

FLEMING, Stuart. *Thermoluminescence techniques in archaeology*. Oxford, Clarendon Press, 1979. viii + 233 pp., 20 pls., 68 figs., 8 tables. £15.50.

This book brings together the contributions made by Stuart Fleming (mainly while at the Research Laboratory for Archaeology and the History of Art in Oxford), and many others, to the study of the problems and applications of TL dating. A certain amount has been published in the journal *Archaeometry*, largely during the years 1970–8, but in this book Fleming attempts an 'overview' of the past 15 years of world-wide intensive research carried out by a number of researchers in various TL laboratories.

In the first six chapters, Fleming outlines the properties of natural radioactivity, the basic features of TL energy storage and the main techniques of TL dating: quartz inclusion, fine-grain, predose, subtraction and zircon techniques. Problems for future research (e.g. into environmental factors) and certain corrections to a number of error sources with the goal of more dating precision, are suggested. The author has interspersed direct archaeological examples of the TL techniques or problems of accurate estimations, during the detailed methodological descriptions in Chapters 1–6, but in a major chapter, 7, he cites more specific examples of the applications of TL to archaeological and art historical materials, i.e. ceramics and the casting-core of bronzes.

To outline the scope of TL, 31 archaeological examples (e.g. Nok terracotta heads, Bandkeramik sherds, Haçilar figurines, T'ang dynasty funereal wares) and 15 art historical examples (e.g. Islamic dishes, Renaissance terracottas) cover TL/C-14 comparability dating, authenticity analyses and fake detections. Various random and systematic errors in application are described and examined; also some unsolved TL 'mysteries', e.g. Hui Hsien figurines, Glozel tablets and anthropomorphic vessels.

Appendices A–D cover supplementary detailed TL data, while appendices E and F are perhaps more directly relevant to archaeologists. Appendix E summarises key TL dating results of the Oxford Research Laboratory with detailed annotations and comments on their archaeological or art historical context. In a useful concluding appendix, F, guidelines for collection of sherd samples for TL dating on site by archaeologists are set out, with important accessory notes on factors governing sherd choice and environmental considerations.

As a whole this book provides a clear and readable introduction to the physical fundamentals of TL, and the scope and complexity and some of the pitfalls of TL research, as well as highlighting important applications in the archaeological and art historical worlds. It is well supplied with figures, tables and plates supplementing and elucidating the text and there is a useful list of 215 references. It is therefore a welcome addition to the bookshelf of those interested in all aspects of TL and their applications as well as future research potential.

C. R. CARTWRIGHT

GARDIN, Jean-Claude. *Archaeological constructs: an aspect of theoretical archaeology*. Cambridge, Cambridge University Press; Paris, Editions de la Maison des Sciences de l'Homme, 1980. xii + 202 pp., 27 figs. £15.00.

That the whole subject of archaeological publication is in a mess can scarcely be denied. In this country aspects of the problem were highlighted, but not solved, by the Department of the Environment's *Principles of Publication in Rescue Archaeology* (1975), and discussion has tended to concentrate on the more practical aspects: for example, on the rescue archaeology boom of the 1970s and/or the peculiarities of Government funding as causes, and on technical and organisation solutions – from offset-litho and microfiche to the relative merits of county society journals and monograph series. In this book, Mr Gardin looks more deeply at the whole problem. Recognising that archaeologists are faced with an ever-growing body of literature with which they should at least be acquainted in order to function properly, he concludes that 'the form and usage of archaeological literature are not in conformity with its function' (p. 148). He argues that 'Constructions', defined as 'any written text presented . . . in the archaeological literature' (p. 13) are written as if they were novels, to be read from cover to cover, while in practice they are almost always used as works of reference. Literary style, essential if a work is to be 'readable', may actually hinder the real business of extracting information. He divides 'Constructions' into 'Compilations' (defined as descriptions of material brought together to facilitate study, see p. 26) and 'Explanations' (defined as the reconstitution of past events or ways of life, see p. 27, i.e. explanations of the archaeological record, not of the events themselves). The main function of a Compilation (see Chapter 3) is seen as information retrieval, for which purpose 'natural language' (NL) is not efficient, and an 'information language' (IL) is proposed – put crudely, a system of indexing based on coded characteristics. Here he disposes of the myth of the simple all-purpose 'objective' description, making the point that no description is neutral, but depends on both past work and the author's intentions.

The analysis of Explanations (Chapter 4) reveals more fully a deeper purpose of the book, the 'analysis of intellectual processes in archaeology'. Part of the publication problem, as Mr Gardin sees it, is a symptom of the intellectual poverty of much archaeological reasoning. Behind the cosmetic of elegant literary variation, he sees only three lines of archaeological interpretation, Functionalism, Diffusionism and Evolutionism (p. 94), which can be used in any situation. Even in deciding between these meagre three, the archaeologist is forced to fall back on mere plausibility (p. 96), while, according to the author, an interpretation is not an explanation unless it can be demonstrated why one should be favoured above another (p. 92). His way out of this apparent impasse is 'logicism', already introduced in Chapter 1 as 'a method of reasoning that stands halfway between the usual freedom of archaeological discourse and the narrow constraints of formal thinking'. Using this approach, he exposes (*inter alia*) the essential sameness of 'new' and old archaeology, and the phoneyness of what often passes for the testing of archaeological hypotheses.

For those overwhelmed by the technicalities of Chapters 3 and 4, Chapter 5 provides a clear and coherent statement of the author's views. He divides archaeological Constructions into six (not necessarily sequential) stages – Objectives, Selection, Description, Ordering, Interpretation and Validation. His comments on Selection are valuable, particularly the one that 'there comes a point when the costs incurred in the acquisition of new data seem to override the marginal gain in knowledge that may accrue' (p. 138), but his views on Description are more dangerous, especially the one that in publication 'the descriptions which traditionally precede the interpretation of a set of objects be restricted to the features actually used in the process, *to the exclusion of all others*' (p. 139). Fine if the objects survive in a museum for further study, but what if they are archaeological contexts about to be destroyed? Clearly total record is impossible, but to record only what one needs to prove one's point is not the way either.

The impact of these discussions on the form of archaeological publication comes in Chapter 6. Here we have recommended something akin to the 'level 3' and 'level 4' of the Frere report (to which, incidentally, the author does not refer), and a condemnation of the routine ritual of archaeological publication. Much, he feels, should not be published at all, and is dismissed as 'Feuilletons'. Finally, there comes a strange chapter in which the author, as a person, realises that he does not like the direction in which his activities as a scientist are taking him.

This book contains much valuable criticism of present-day archaeological reasoning and publication. Unfortunately, it offers little of value in its place. Its reliance on formal (or rather, pseudo-formal) methods of analysis is not suitable for most archaeological data, for which a probabilistic (Bayesian) or 'fuzzy' (Zadeh) approach would be more appropriate. Mere plausibility, perhaps in one of its more mathematical disguises (e.g. likelihood, support), is the best one can hope for in archaeology. The faith in information retrieval is perhaps a little misplaced – important though it is, we also need to really understand our data, by looking at them in different ways, or simply by 'reducing' them (Ehrenberg). We need to be able to form a working relationship with our data, and the use of IL (valuable though it may be in some respects) is inimical to this relationship. A secondary weakness is the author's preference for verbal as against iconic data (p. 32), and apparently even against the actual material from which they are derived. The reason is surely cultural rather than rational, and may lie in either a dislike of getting one's hands dirty or in that irrational respect for the written that often bedevils rational men. Finally, it is significant that the only case-study in this book is both trivial and inconclusive, suggesting, to me at least, that it is at best premature, and at worst irrelevant to the very real archaeological problems it seeks to solve.

CLIVE ORTON

HARRIS, E. C. *Principles of archaeological stratigraphy.* London, Academic Press, 1979. xiii + 136 pp., 40 figs., 1 pl. £8.00.

This book marks a vital step in the development of archaeological method. It is a pity to have to qualify this statement, but since both the book, the author and some of his ideas have many opponents it will be just as well, after describing what the book has to offer, to mention some limitations.

The thesis on which the book is based examined the idea of archaeological recording, and especially stratigraphy, and followed its development right through to the present. The more historical, discursive and, in places, inflammatory sections have been omitted to make a book which has a very simple and didactic purpose, that of telling the student what archaeological stratigraphy is and how it should be excavated and recorded. As such I cannot see how any reading list can be without it, and I cannot see how any excavator can disregard it, for its principles are absolutely basic to good excavation.

There is one main section, 'Aspects of Archaeological Stratigraphy' which deals with stratification as it occurs in the ground, and above ground, and explains how the author thinks it should be

recorded and interpreted. This 'meat' is preceded by a 30-page section on the historical background, and followed by a similar section of more personal appendices and glossary. The matrix, a diagrammatic representation of the relationships of all the features, layers, contexts or whatever, one to another, does not appear until the end of the second section, so that it takes its rightful place as a means to an end, rather than as an end in itself, and the mainspring for the whole book.

For me there are two major points in this book. The first is the dictum that any relationship between deposits must be settled while the excavator is literally in touch with those surviving deposits; that the chances of deciding questions of relationships in abstract after the end of the dig are nil. The second is that the best available tool for making an excavator make these decisions is the use of a matrix, for, if he does it properly he has to make all the vital decisions necessary to his final interpretation, and others' re-interpretations. There is an important corollary: that if the matrix is constructed deposit by deposit as each one is dug the dig finishes with all stratigraphic relationships having been taken at the optimum time with the minimum of trouble, and, if the director knows what he is doing, the final phasing of the site need only be a day or two behind the close of digging. This has actually been demonstrated in practice by a combination of Ed Harris and his matrix, and Steve Roskams, director of the Post Office site, just to the north of St Paul's Cathedral in London, and, since it worked on such a complex site as that, with few problems, there can be no excuse from this time forward, for the analysis or phasing of a site to wait until the work of post-excavation synthesis begins. I would suggest to the Department of the Environment and all grant-giving bodies that all expenditure on post-excavation work on sites where this has not been done should be stopped, and that this should be a requirement for all future assistance for the writing up of sites.

Finally, to return to qualify the 'vital step'. The book *marks* a vital step; it is not in itself a complete vital step as such. Ed Harris has caught an idea that was in the air in the early 1970s and fixed it on paper. Many of his detractors have said that he did not invent the idea of the matrix for many people at that time were trying out similar ideas. The evidence is hard to come by, but let us accept that this is true. What matters is not who thought of the idea, or who was using it, but who developed and refined it, and, against strong opposition which thought him merely a crank, pushed the new idea into the forefront of archaeological method. On this point there can be no doubt, for the evidence is clearly in print.

The drawings are excellent. They make their points with elegance and economy and a really intelligent student could perhaps catch the whole idea from them alone. Perhaps this is just as well, for even after fourth or fifth reading I find a few pages still heavy going, especially the various interfaces, horizontal, vertical, feature, period and layer, whose cumbersome titles gum up the free flow of expression. It is rumoured that some critics have found some sentences in the book which sound good but mean nothing. But when the idea of the book is so important who but a sickly pedant would worry about that? And anyway it should boost sales in America.

RICHARD REECE

JOHNSTONE, Paul. *The sea-craft of prehistory*. Prepared for publication by Sean McGrail. London, Routledge & Kegan Paul, 1980. xviii + 260 pp., illus., maps. £13.50.

The choice of title for this book is unfortunate, as much of its subject matter is not prehistoric; this and many other far less major criticisms I have of the book may largely be due to Mr Johnstone's untimely death before the completion of the work.

Perhaps a better title would have been 'An outline of world boat development up to the medieval period'. To assemble this survey which in some sections is of considerable depth, Paul Johnstone draws on archaeological, historical, linguistic, ethnological and experimental evidence. These sources are frequently brought together in a most enlightening way which witnesses the depth of his research, and knowledge of the subject.

In my opinion this book should be essential reading for those dealing in the pre-medieval periods, and for anyone with a special interest in water craft and their evolution. However, as is the case with many books in this field there is no basic glossary of terms, which is essential if readers unfamiliar with boat terms are to make maximum use of this book, and find it easy reading.

Many examples could be given of Mr Johnstone's skill in using his many sources to offer coherent and, usually suitably cautionary, solutions to problems in this field. His discussion of the most likely form of craft to have been used in the early east Mediterranean obsidian 'trade', and the west Scottish stone axe 'trade', is logically argued and his proferred solution seems quite practicable.

His cautious approach and shunning of old diffusionist schemes is also most sensible. His critique of Hornell's suggested model of skin boat development and origins is particularly thorough. However, his linking together of Umiak and Currach is not as clearly argued, as on constructional grounds the differences between them are very great. And on occasion his use of terms is inconsistent, as in his

discussion of expanded dugouts in which he suggests that hard woods were not used for this purpose and then shortly after illustrates a part-completed example of a hard wood dugout in the process of being expanded.

On occasions his critical reserve and good sense are apparently dulled; one example of this is his use of a quote from Marstrander which suggests that the shape and double bow of the Bronze Age boats illustrated in the Scandinavian rock carvings of the period are only comparable with skin boat construction. This idea is contrary to the only evidence we have of this shape of boat from Scandinavia, admittedly dating from a slightly later period, the Als boat, which is wooden. Though this is a contentious area the use of such a quote without much qualification is dubious.

However, his short sharp critique of Heyerdahl's work is very pertinent. He suggests that in its pure ancient form the Egyptian reed 'boat' was only capable of sailing just about dead before the wind, and in Heyerdahl's reconstruction was far too cumbersome to row. And that this being so the 'more knowledgeable than we have imagined them to be ancients' would not have put themselves in a position of being flotsam in an offshore current and wind. Heyerdahl's notions of ancient ocean navigators usually include ideas of the underrated capability of ancient mariners and therefore Johnstone's criticism carries some weight.

DAMIAN GOODBURN

HOGG, A. H. A. *Surveying for archaeologists and other fieldworkers* (Croom Helm Studies in Archaeology). London, Croom Helm, 1980. 315 pp., illus. £17.95; paperback £10.95.

Perhaps there should be a respite in the production of books about elementary surveying. Apart from instrumental refinements the basic techniques of chaining, levelling, etc., have remained virtually unchanged for over a century with the result that such books tend to be very much alike. Although the present example is addressed primarily to archaeologists, applications in this field are so immensely varied that the relevance for some readers may seem rather limited. The main problem in writing a work such as this is to be sufficiently encyclopaedic without discouraging the beginner. For this reason the author has divided his book into those parts which are essential reading and those which are for reference, the latter including theodolite work, tacheometry and some elementary photogrammetry; electronic distance measurement is not discussed, although the shorter-range instruments have great archaeological potential. Sympathetic regard is held for the less numerate reader who 'will turn away in horror' from certain sections, and to whom encouragement is offered that 'at least nine sites out of ten can be easily and accurately surveyed using only the very simplest geometry'. Unfortunately the instrument most congenial to beginners, namely the plane table, is introduced only reluctantly near the end with the comment that 'I would strongly advise against its use'. The reasons which the author then gives (p. 251) seem in fact rather slight – the device has after all been giving service (and presumably general satisfaction) for over 300 years. Apart from such personal idiosyncrasies and preferences the author, a civil engineer and former Secretary of the Royal Commission on Ancient Monuments, has produced an authoritative work in which even experienced archaeological surveyors may find much of interest.

H. M. STEWART

NEEDHAM, J. *Science and civilization in China.* Vol. 5. *Chemistry and chemical technology.* Part 4. *Spagyrical discovery and invention: apparatus, theories and gifts.* Cambridge, Cambridge University Press, 1980. xlviii + 772 pp., illus. £48.00.

The latest part of Needham's great project concentrates on four specific areas: chemical apparatus, chemical reactions in aqueous medium, the theoretical background to Chinese alchemy, and finally a section somewhat inappropriately labelled 'comparative macrobiotics' which discusses the origins of some of the fundamental ideas in medieval Islamic and European science.

The section on apparatus derives its evidence from a wide variety of sources which only Needham could have collected and collated, vessels ranging from museum pieces to the contents of the traditional Chinese kitchen as observed in his favourite Kochiu restaurants, coupled with early descriptions and occasional illustrations or pictograms in contemporary spagyrical manuals. From these sources is revealed an impressive array of often quite sophisticated equipment, especially for distillation. From this naturally flows a discussion on the origins of alcohol, mineral acids, salts, including a fascinating section on the history of copper cementation, i.e. the precipitation of metallic copper from naturally occurring solutions of its salts using iron.

The section on the theoretical aspects of Chinese alchemy again demonstrate the overriding importance of Taoism especially as expressed in the *I Ching*. The importance of numerology in Chinese alchemy is a good example of this. Thus the carefully weighed quantities and carefully timed duration of the reactions were usually based on Taoist theory rather than on any experimental observation. This is probably ancestral to the central place of numbers in Islamic science rather than the Pythagorean 'mystical numbers'. Needham is careful to distinguish between real and apparent connections, but he is anxious to present all the possible evidence for demonstrating a Chinese inspiration behind Western ideas and theories. This is fair enough, it was after all the original purpose of the whole project, and he always states the case honestly, presenting the evidence for and against before stating his preferred interpretation. One does not have to follow him that far, one can accept his reconstructions, or reject them, maybe even as he says of Von Lippman 'to place all his money on a loser!' For example one is a little unhappy with the suggestion that the theories behind anions and cations have their origin in the Yin and Yang theory of opposites, one still likes to believe that at least some of the theories of modern science were independently deduced in the West from experimental observation!

In the section on comparative macrobiotics Needham principally traces Chinese influence on Islamic science. Here he is up against a previously insuperable difficulty – no translations of the relevant Chinese texts into Arabic, or any other language for that matter, are known and the Islamic scientists state quite categorically and repeatedly that their sources were the Syrians, Babylonians and above all the Alexandrian Greeks, but never the Chinese. In fact Needham is driven, in some desperation one imagines, to have to use the quote from the Koran 'go in seek of knowledge even unto China' as literary evidence of Sino-Islamic contact (although surely here suggesting just the opposite, China was the most remote place the author could think of). Despite this Needham does succeed in establishing a clear link. Previously, whilst our knowledge of the Chinese spagyrical texts was so limited the Chinese influence on Islamic science was usually ignored, but now with Needham's own exposition of these texts he can quite convincingly demonstrate that many of the methods and theories of Islamic science were originally Chinese. Far from being just the link between the Hellenistic and Medieval alchemy, Islamic science was very much an amalgam of Chinese and Greek and it was ideas from both that form the basis of European science. He also demonstrates the extensive Sino-Islamic contact which took place in Central Asia in the early years of Islamic expansion and points out that many of the greatest of the early Islamic scientists lived in the east rather than the west or central part of the Islamic world. In this section he discusses *Khar Sini*, 'Chinese iron metal' and suggests it was really cupro-nickel. This is unfortunate as independently Craddock and Allan have recently shown that it must refer to a high tin bronze.

This work shares with its predecessors abundant evidence of tremendous research and learning spread over a breath-taking range of knowledge coupled with personal observation and experience gathered through long years living and travelling in the East. If a work of this depth and complexity is to be any use at all it has to be easy to read and Needham's style is superb, always lively, often idiomatic, full of quotes from the classics of Sanskrit, Taoist, Islamic literature as well as more familiar works such as Ben Jonson (*The Alchemist*, of course) and even Byron. Historians of science seem to have this happy knack of weaving literary quotes into their works, Holmyard springs to mind as another good example. The result here is most felicitous and the whole massive work is easily assimilated, a pleasure to read.

We have before us then another major work in this series crammed with facts, references, ideas, such that no one interested in the history of ideas, science or technology can ignore this book.

The earlier over-emphasis on Greek science is now being corrected by works such as Fuat Sezgin's *Geschecte des Aravischen Schriftums* as well as Needham's own research. Apart from Ray and Bose we still lack a comprehensive history of Indian science which will be necessary before a general synthesis of the history of science can be attempted. Needham's work is so wide ranging, displaying such a great knowledge of Western and Islamic science as to be almost a synthesis in itself, although perhaps too partisan, an inevitable reaction against the previous bias against China. However, if and when such a work is attempted much of the ground work will have been covered by *Science and civilization in China*.

In an age when Britain has lost much of her former economic and political prestige let us salute our scholars, whilst volumes such as these are appearing we still have something of which to be proud!

P. T. CRADDOCK

SMITH, John F. *A critical bibliography of building conservation*. London, Mansell, 1978. xii + 207 pp. £12.90.

Papers on conservation, particularly those of a technical nature, are, as the Foreword in this publication reminds us, often in restricted editions or relatively little known journals. This bibliography

with more than 2,000 items, brings together in one volume many of the references needed by those involved in conservation.

The material is arranged in ten main sections, starting with the History and Philosophy of Conservation, then through a logical order of descending elements of buildings, their contents, etc. Each section is further divided, into, for instance, materials, problems, precautions, Statutory Requirements, and so on. It ends with a useful list of Grantgiving Bodies.

Although, however, it is stated to be a selective bibliography 'using critical judgement' it may perhaps be too comprehensive, with only a small proportion of the items having a critical assessment of their value, and some not even a description of the contents. Might it have been better to have been more selective, to have given a critical appraisal of each reference? A problem too (with all bibliographies) is potential obsolescence – this volume includes material only up to 1976, and one wonders how and when it can be updated – a more selective format could have eased this problem.

The bibliography is, nevertheless, a valuable addition to the bookshelves of those concerned with conservation, especially at a time when far more emphasis is, rightly, being put on conservation, as opposed to replacement, of our environment.

PETER E. LEACH

BAKER, J. and BROTHWELL, D. *Animal diseases in archaeology* (Studies in Archaeological Science). London, Academic Press, 1980. x + 236 pp., 94 figs. £12.80.

This book, written by 'a veterinary pathologist with an interest in archaeology' and 'an archaeologist with an interest in bones and their diseases' presents a survey of the evidence for disease in archaeological material, using as examples bones from Britain and abroad, especially from the Americas. A brief historical survey of ancient veterinary writings introduces the book and chapters on various categories of disease and abnormalities follow, with a discussion of the natural history and modern understanding of each disease followed by a list of ancient examples.

The discussion of a potentially valuable source of archaeological information is very welcome, but the main failing of the book would seem to be in its uncertainty as to whom to address itself. Doubtless it will be of interest to any veterinary scientists with an interest in the history of animal disease but its title suggests that the main audience should be archaeologists. An environmental archaeologist specialising in animal bones will find the book informative as it gives a comprehensive outline of the variety of animal diseases that could be recognised in bone material. Inevitably, some bone specialists will attempt to use the book to identify the cause of skeletal abnormalities they themselves have observed, but although the book does not specifically invite them to use it as a disease identification manual, nor does it caution them of the possible dangers in so doing. Although the quality of the photographs is extremely high, they are not always fully described in the text. Not all the diseases are illustrated nor are they all sufficiently well described to ensure accurate identification. Sometimes the organisation of the book is confusing. For example, 'croteach' is mentioned on page 45 as a disease with effects so severe as to be likely to be detectable in archaeological material. However the description of the effects of the disease are not given until page 164, with no cross reference to the description given in the main text.

The main fault of the book is however in its lack of appeal to the general archaeologist, as it is the excavators and those that control the financing of archaeology that most need to be convinced of the value of studying ancient pathology. The vocabulary of the book is specialised and although there is a useful glossary of terms and an index, they are not entirely comprehensive. 'Catabolise', for example, appears neither in the glossary and the index nor in the Shorter Oxford English Dictionary. The section on interpreting mortality and the general discussion are both too brief and while it is recognised that the amount of evidence for disease in archaeological material is as yet too small for many inferences to be made, there is a need for a much broader discussion of the potential value of the study of this subject. A chapter on the archaeological evidence for possible veterinary instruments and animal stalls, tied to the implications these have for animal management and the understanding and treatment of disease, would have been most welcome. More information would be welcomed of the kind given in the section on 'the statistical aspects of fractures' (p. 91), where figures for 'normal' and 'abnormal' frequencies of fractures are suggested. A more historical approach to the discussion of the ancient examples of diseases and abnormalities would have made for clearer reading.

The chapter on non-skeletal evidence of disease, which demonstrates the importance of the remains of parasites as indicators of the likely presence of the diseases caused or carried by the parasites is, however, a good example of the value of cross-disciplinary co-operation in archaeology.

Let us hope that interest in the subject is stimulated – I suspect that the book may unfortunately be ignored by those for whom the reading of it would be most valuable.

ANNIE GRANT

DIMBLEBY, G. W. *Plants and archaeology: the archaeology of the soil,* 2nd edn. London, Black and Granada Publishing Co., 1978. 190 pp., illus. £5.75 hardback; £1.50 paperback.

It is very good to see *Plants and archaeology* re-issued and updated. The first edition (1967) has been out of print for some years and secondhand copies were much sought after. In this revision some sections have been expanded though the bulk of the material remains relatively unchanged.

The first part of the book concentrates on a description of the use of plants by ancient man. The variety and importance of plants is stressed, from their use in building construction to their use in the production of alcohol. Just over half of the book is devoted to a discussion of the nature and interpretation of the botanical evidence. This is the most valuable section, the principal methods of analysis are fully described and discussed and Professor Dimbleby shows clearly the value of botanical studies in archaeology whilst not failing to point out drawbacks and possible sources of error.

If *Plants and archaeology* has a failing it is that it considers the botanical evidence in relative isolation from other aspects of archaeology. That Professor Dimbleby is not unaware of this problem is made clear in his introduction. However, he fails to stress the relationship between plant materials and other forms of archaeological evidence. It is still commonly considered that biological material from excavations is somehow different from other finds – it is the responsibility of 'boffins' in white coats who will contribute an appendix to the main excavation report. Professor Dimbleby illustrates the importance of plants to ancient sites; it is essential that archaeologists (and natural scientists) come to realise that plant remains are as much a part of a site's archaeological record as the pottery or flint. Indeed, where present, plant evidence frequently contributes much more to the understanding of a site than any amount of elaborate collection of cultural rubbish.

N. D. BALAAM

SCHLÜCHTER, Christian (*ed.*). *Moraines and varves: origin, genesis, classification.* Rotterdam, Balkema, 1979. xiii + 441 pp., illus. £20.00.

Varves have been neglected by archaeologists, and moraines are not likely to contain human artefacts. Varve chronologies nevertheless now promise to be of great importance in archaeology and weather history. Holocene varves in non-glacial environments are being counted and measured in various parts of the world: in Europe long series have been counted in the USSR, Switzerland, Yugoslavia and Germany and in England varves formed in lakes in Norfolk and Suffolk are being investigated by Dr H. J. B. Birks at Cambridge. Such varves can be cross-dated with tree rings wherever they are affected by common meteorological factors: the summer-sensitive West German oak chronology of Hollstein, now extending from 691 BC to AD 1975 (E. Hollstein, *Mitteleuropäische Eichenchronologie,* Von Zabern, Mainz, 1980), is likely to provide a useful check on the dating of north European varves. Glacial varves constitute chronologies floating in time but as soon as an overlap can be found for the period 7250–6300 BC an absolute chronology will be practicable throughout the past 15,000 years.

The book consists of selected papers presented at an INQUA symposium at Zurich, a symposium that attracted participants from many parts of the world. Moraines are the theme of the first part; this is indeed of special interest (e.g. pp. 180–1) to geomorphologists and geologists but we discuss here the second part, devoted to varves and glaciolacustrine deposits, as that is of more relevance to archaeologists.

The term 'varve' should no longer be restricted to laminated couplets of glacial origin, as Dr Stürm (Zurich) the President of the Work Group emphasises in his introduction (p. 279). Indeed, the outstanding fieldwork, in the Black Sea and in Lake Van (Turkey), of Kempe and Degens, summarised here in English (pp. 309–18), relates to Holocene varves. The Black Sea varves provide some measure of man's activities in the surrounding countries for over 5,000 years, the rate of sedimentation increasing in fits and starts between AD 300 and 1200. The Lake Van varves provide a record of winter half-year rainfall through over 8,000 years, and are significant for the climatic chronology of the Middle East as a whole. A period of low lake level – a 'salinity crisis' – extends from dates provisionally given as *c.* 7600/6200 BC and 4500/3800 BC. Moist winters are dated 5000 BC, 2600 BC and *c.* AD 550. Sunspot and lake-level correlations found in the period 1944–74 are believed by the authors to be typical, as a pilot study of layers about 7000 BC revealed a similar cycle of about 10 years.

Tree rings and varves in Turkey and the Black Sea area are discussed also in the reviewer's paper that follows (pp. 319–25); they are correlated with one another and with the Bristlecone pine chronology and hence provide possible dates for Biblical droughts.

Varve studies are being actively and effectively pursued in North America (e.g. pp. 295 ff.). Swain (*Quat Res* **3**, 1973: 383–96) took pollen samples every tenth varve and similar combined studies in south Ontario by Maria Boyko-Diakonov (pp. 303–7) promise results that will be relevant also to the climatic history of Europe.

The third and last section is devoted especially to the Quaternary of Switzerland, where current studies include moraines, old engravings, C-14 dated fossil soils, tree rings (and their densitometry) as well as varves. The paper by Roethlisberger (pp. 387–421) with its useful bibliography gives some insight into what is being achieved.

The underwater varves of the Red Sea and of the Santa Barbara Basin in California are not discussed in this book, but there is enough to make it clear that truly annual varves are formed in many ways and are much more frequent than has hitherto been assumed.

D. J. SCHOVE

BUTLER, P. M. & JOYSEY, K. A. (*eds*). *Development, function and evolution of teeth.* London, Academic Press, 1978. xix + 523 pp., illus. £28.50.

This volume evolved out of an international symposium at Cambridge in 1974.

The meeting was attended by a wide variety of biologists from such divergent fields as anatomy, anthropology, embryology, genetics, physiology and palaeontology. For teeth are perhaps unique in that they can be studied in so many ways both in life, and because of their generally good preservation long after death. From the point of view of archaeology, not only can human dentition be considered in terms of evolutionary changes in the hominids and the changing frequencies of oral disease, but teeth of associated fauna show changes through the Pleistocene and beyond (into agricultural times). Shape variation in teeth of small mammals (used as time and environmental indicators) are of course extremely important.

For these reasons, this volume is an important reference work, drawing together both recent research and also more general syntheses on aspects of dental studies. There is plenty of variety here, not all of course equally interesting to those of us working on archaeological material. From my point of view, the papers by Kirveskari on dental variation in the Lapps, dental crown variation by Berry, sexual dimorphism in teeth by Hanihara and also Moss, dental variation in medieval Javanese, and aspects of ageing and attrition by Miles and Lunt are notable.

For anyone wishing to investigate the dentitions of early human samples, they should certainly be aware of this publication. Added to this, various papers are relevant to investigations within the related field of zooarchaeology, especially the study of mammalian mastication by Hiiemae, aspects of attrition in small herbivores by Rensberger, and estimating age in wild mammals by Morris.

A very worthwhile collection of studies.

DON BROTHWELL

COCKBURN, A. and COCKBURN, E. (*eds*). *Mummies, disease, and ancient cultures.* Cambridge, Cambridge University Press, 1980. 340 pp. £25.00.

It is over 50 years since Sir Grafton Elliot Smith and Warren Dawson wrote on Egyptian mummies, and far longer since the Archaeological Survey of Nubia considered the many hundreds of bodies found at the turn of the century. Surprisingly, and rather sadly, progress in studying the biology of past human populations has progressed slowly since then. This is partly the result of a relative eclipse of effort concerned with the archaeology of man himself, and partly a consequence of the slow development of biological work concerned with human remains. In this new book, which is edited by two individuals who are prominent in a new International Palaeopathology Association, we see something of the renewed interest in various aspects of the subject. In all, there are 20 separate contributions. In the first three parts, there is a detailed consideration of the mummies and mummification techniques of Egypt (Part I), the Americas (II) and of the world in general (III). It is clear from this that 'mummy' is used in a very general sense to mean dried or preserved bodies, whether from Danish bogs and arid Peruvian sites or from truly mummified Egyptian remains.

Part IV contrasts notably from the preceding sections in being concerned with 'The Study of Mummies', that is, the extraction of biological information on these bodies. Angel considers the 'forensic' aspects of age, sex and other individual data, and Rayman and Dowd evaluate the techniques and technical problems of palaeohistology. Jeanne Riddle demonstrates the potential of studying mummy tissue by electron microscopy and shows the dangers of misinterpreting for example fungal spores as erythrocytes (blood cells), Kristen and Rayman similarly emphasise the value of radiography in such studies. Aspects of the biochemistry of this material is given in the studies by Barraco (palaeobiochemistry) and Henry (palaeoserology), which are all too brief in view of the fact that the chemistry of ancient man is potentially one of the most profitable areas for research in the future.

All in all, this is a valuable reference work, but Part IV could have been very usefully expanded tenfold.

DON BROTHWELL

TRIGGER, Bruce G. *Gordon Childe: Revolutions in Archaeology*. London: Thames and Hudson, 1980. 207 pp., 4 figs., 33 pls. £10.00

The recent spate of books and theses on Gordon Childe demonstrates one thing very clearly, namely that a quarter of a century after his death Childe's thought is still very much a living issue. There was relatively little of special interest in the outward events of his life, except in so far as they can be shown to have influenced his intellectual development, so that it is with his ideas and their relevance for archaeologists and others today that these writings concern themselves. This remains true even though one of them (Sally Green's book published by the Moonraker Press) is actually called a biography.

Among these works the book by Bruce Trigger reviewed here deserves a special place. It is a sympathetic and perceptive study by one who, as a distinguished Canadian archaeologist, has taken his full share in the debates of the last two decades about the 'nature and nurture' of archaeology, and is exceptionally well placed to revaluate Childe's *oeuvre* in relation to recent American and European thinking. That is not to say that there are no weaknesses in the book, but they mainly concern the historical background and Childe's relationship with, and contribution to, the development of archaeology specifically in Europe. The second half of the book is less affected, and, dealing with subjects closer to the author's immediate interests, makes more stimulating reading than the first. As he says (p. 16), there are many differences of opinion about when Childe did his best work, but it is clear that he himself finds Childe's later work, from about the mid-1930s on, of most interest and relevance, dealing, as much of it does, with the broader issues of archaeological theory. 'The major questions that he dealt with at the end of his career', Trigger asserts in his final sentence, 'are now more critical to the future of archaeology than they were when he first raised them'.

Given this standpoint, it is not entirely surprising that the short chapter on 'Archaeology before Childe' somewhat oversimplifies the already long and fairly complex history of archaeological studies and controversies in Europe which preceded Childe's advent on the scene. This was certainly less tidy than Trigger implies if only because there was no real profession of archaeology and little co-ordination of thought about its principles. The steady activity of collecting and classifying material, on the other hand, went ahead in some degree independently of shifts in thought about the broad lines of human development, and it was this which provided Childe with the groundwork of the 'Dawn' and the 'Danube'.

The core of the book may be regarded as a kind of biography of Childe's thought. After the short introductory chapter, followed by the historical one already referred to, there follow nine chapters which treat various aspects of Childe's thinking more or less as stages which succeed each other in a roughly chronological order. Broadly speaking this is a reasonable way to tackle the problem; however, many of Childe's preoccupations continued over a long period in different forms, so that it is necessary to reach both backwards and forwards in time as necessary in order to complete the treatment of each theme. On the whole the arrangement works well, and a coherent picture of Childe's intellectual odyssey emerges with a minimum of repetition.

In these chapters Trigger also succeeds very well in bringing out the constantly shifting character of Childe's thought, as he responded not only to what he read, but also to stimuli coming from his ever widening contacts and his growing first-hand knowledge of the evidence. In particular, he shows that Childe was not as unaware of New World archaeology, or of New World archaeologists and their ideas, as has been supposed, although he refrained from dealing explicitly with New World archaeological material in his publications. It is most important to realise that Childe took what he wanted from all quarters, regardless of his particular likes and dislikes, if it seemed likely to be useful for his purposes. He himself was at times mischievously prone to giving an impression of invincible prejudice in certain matters, which seems to have misled many of his colleagues.

Naturally, he also had his limitations as a thinker, which Trigger faithfully registers. Such are his excessive preoccupation with artefacts, to the exclusion of other kinds of evidence, his failure to make full use of the possibilities of ethnographic parallels, and his proneness to offer explanations which were often naively rationalistic, anachronous, or based on far too little evidence (as in his well-known postulation of itinerant smiths in Bronze Age Europe). Like other features of his approach, however, such as his refusal to employ statistical methods, though recognising that these were fundamental to the evaluation of archaeological evidence, these failings can often be excused, at least partially, by the state of knowledge at the time when he was writing.

In his final chapter Trigger carefully sums up Childe's contributions to the development of archaeological thought, and indicates not only to what extent some of these anticipated present trends, but, more significantly, to what extent they are currently of value as a critique by anticipation of some of these. In particular, Childe's concern with the developing nature of man through time, and his conception of the task of archaeology as basically historical rather than nomothetic, are seen as specially important, a view with which the present reviewer would thoroughly concur.

Though this is not the last word on Childe – it is still too early for that! – it is an important study which deserves to be read and pondered by all who are interested not simply in Childe, but in the past and the future of archaeology itself.

J. D. EVANS

BOOKS RECEIVED

ARICESCU, A. *The army in Roman Dobrudja.* Translated from the Romanian by Nubar Hampartumian (BAR Int. Ser. 86). Oxford, British Archaeological Reports, 1980. 225 pp., 5 maps. £10.00.

BARRUOL, G. (*ed.*). *Ruscino: Chateau-Roussillon, Perpignan (Pyrénées–Orientales).* I. *Etat des travaux et recherches en 1975* (Revue archéologique de Narbonnaise, Suppl. 7). Paris, De Boccard, 1980. 367 pp., 133 figs., 41 pls. Fr. 290.00.

BEN-TOR, A. *Cylinder seals of third-millennium Palestine* (ASOR Bulletin Suppl. Series 22). Cambridge (Mass.), American Schools of Oriental Research, 1978. 121 pp., 25 figs., 11 pls. $12.00.

BICKERMAN, E. J. *Chronology of the ancient world* (Aspects of Greek and Roman life), rev. edn. London, Thames and Hudson, 1980. 223 pp. £4.95.

BOARDMAN, J. *The Greeks overseas, their early colonies and trade.* New and enlarged edn. London, Thames & Hudson, 1980. 288 pp., 319 illus., 6 maps. £12.00.

BROWNING, I. *Palmyra.* London, Chatto and Windus, 1979. 223 pp., 151 figs., 4 maps. £8.95.

BURGESS, C. *The age of Stonehenge* (History in the Landscape Series). London, Dent, 1980. 402 pp., illus. £12.00.

BURLEIGH, R. (*ed.*). Progress in scientific dating methods (British Museum Occasional Paper 21). London, British Museum, 1980. 90 pp., illus. £3.75.

CARSON, R. A. G. and KRAAY, C. M. (*eds*). *Scripta nummaria romana: essays presented to Humphrey Sutherland.* London, Spink and Son, 1978. xiii + 250 pp., figs., 24 pls. £20.00.

CLARK, J. D. G. *Mesolithic prelude: the paleolithic-neolithic transition in Old World prehistory.* Edinburgh, Edinburgh University Press, 1980. viii + 122 pp., 32 figs. £4.50.

CLARKE, G. *The Roman cemetery at Lankhills. Pre-Roman and Roman Winchester,* Part II (Winchester Studies 3 : 1). Oxford, Clarendon Press, 1979. xl + 455 pp., 105 figs., 17 pls. £40.00.

CONNAH, G. *Three thousand years in Africa: man and his environment in the Lake Chad region of Nigeria* (New Studies in Archaeology). Cambridge, Cambridge University Press, 1981. xx + 268 pp., illus. £25.00.

DAMS, L. *L'art pariétal de la Grotte du Roc Saint-Cirq.* French text with English summary (BAR Int. Ser. 79). Oxford, British Archaeological Reports, 1980. 149 pp., 90 figs. £9.00.

DAVIES, G. I. *The way of the wilderness: a geographical study of the wilderness itineraries in the Old Testament* (The Society for Old Testament Study Monograph Series 5). Cambridge, Cambridge University Press, 1979. xii + 138 pp., 3 maps. £7.95.

DE JESUS, P. S. *The development of prehistoric mining and metallurgy in Anatolia* (BAR Int. Ser. 74), 2 vols. Oxford, British Archaeological Reports, 1980. 495 pp., 23 pls., 6 tables, 11 graphs, 21 maps. £17.50.

FITZHARDINGE, L. F. *The Spartans* (Ancient Peoples and Places 95). London, Thames and Hudson, 1980. 180 pp., 150 pls. £9.50.

FREEDMAN, D. N. *Preliminary excavations reports: Bâb edh-Dhrâ', Sardis, Meira, Tell el-Hesi, Carthage (Punic)* (ASOR Annual 43). Cambridge (Mass.), American Schools of Oriental Research, 1978. 190 pp., illus. $17.50.

FREEDMAN, D. N. *Archaeological reports from the Tabya dam project, Euphrates valley, Syria* (ASOR Annual 44). Cambridge (Mass.), American Schools of Oriental Research, 1979. vii + 182 pp., illus. $20.00.

GOFF, C. *An archaeologist in the making: six seasons in Iran.* London, Constable, 1980. 284 pp., illus. £9.95.

HANSON, W. S. and KEPPIE, L. J. F. (*eds*). *Roman frontier studies, 1979. Papers presented to the 12th International Congress of Roman Frontier Studies* (BAR Int. Ser. 81), 3 vols. Oxford, British Archaeological Reports, 1980. 1,111 pp., illus. £28.00.

HARRISON, R. J. *The Beaker folk: Copper Age archaeology in Western Europe* (Ancient Peoples and Places 97). London, Thames & Hudson, 1980. 176 pp., 118 illus. £12.00.

HODDER, I., ISAAC, G. and HAMMOND, N. (*eds*). *Pattern of the past: studies in honour of David Clarke.* Cambridge, Cambridge University Press, 1981. ix + 439 pp., illus. £27.50.

HODDINOTT, R. F. *The Thracians* (Ancient Peoples and Places 98). London, Thames & Hudson, 1981. 192 pp., 168 illus. £12.00.

HOLDER, P. A. *Studies in the 'Auxilia' of the Roman army from Augustus to Trajan* (BAR Int. Ser. 70). Oxford, British Archaeological Reports, 1980. 352 pp., 11 pls. £11.00.

HOPKINS, C. *The discovery of Dura-Europaso.* Edited by Bernard Goldman. New Haven, Yale University Press, 1979. xxiv + 309 pp., illus. £12.60.

HOROWITZ, A. *The Quaternary of Israel.* London, Academic Press, 1979. xv + 394 pp., illus. £25.00.

KILBRIDE-JONES, H. E. *Celtic craftsmanship.* London, Croom Helm, 1980. 266 pp., 83 figs. £15.95.

KILBRIDE-JONES, H. E. *Zoomorphic penannular brooches* (Reports of the Research Committee of the Society of Antiquaries of London 39). London, Society of Antiquaries of London, 1980. Distributed by Thames and Hudson. xvii + 153 pp., 52 figs. £20.00.

LEITAO, M. *Boats of the Lisbon river: the 'Fragata' and related types* (Maritime Monographs and Reports 34). Greenwich, National Maritime Museum, 1978. viii + 154 pp., illus. £3.00.

LINDGREN, C. *Classical art forms and Celtic mutations: figural art in Roman Britain.* Park Ridge, (NJ), Noyes Press, 1980. xi + 148 pp., 14 figs., 96 pls. $24.00.

LLOYD, Seton. *Foundations in the dust: the story of Mesopotamian exploration,* rev. edn. London, Thames & Hudson, 1980. 216 pp., 80 illus. £12.00.

LYNCH, T. F. *Guitarrero cave: early man in the Andes* (Studies in Archaeology). London, Academic Press, 1980. xviii + 328 pp., illus. £13.00.

MACKENDRICK, P. *The North African stones speak.* London, Croom Helm, 1980. xv + 434 pp., illus. £10.95.

MCNAIRN, B. *The method and theory of V. Gordon Childe: economic, social and cultural interpretations of prehistory.* Edinburgh, Edinburgh University Press, 1980. 184 pp. £3.75.

MATTHIAE, P. *Ebla: an empire rediscovered.* Translated by Christopher Holme. London, Hodder and Stoughton, 1980. 237 pp., illus. £12.95.

O'CONNOR, B. *Cross-Channel relations in the later Bronze Age: relations between Britain, north-eastern France and the Low Countries during the later Bronze Age and the early Iron Age, with particular reference to the metalwork,* 2 vols. (BAR Int. Ser. 91). Oxford, British Archaeological Reports, 1980. 858 pp., 76 figs., 82 maps. £26.00.

POPHAM, M., SACKETT, L. M. and THEMELIS, P. G. (*eds*). *Lefkandi I, the Iron Age: the settlements: the cemeteries* (British School of Archaeology at Athens Suppl. Vol. 11), 2 vols., plates and text. Thames & Hudson, 1979; 1980. 50 pp., 284 pls.; 464 pp., figs., 1 pl. £27.00; £46.00.

POWELL, T. G. E. *The Celts,* new edn. London, Thames & Hudson, 1980. 232 pp., 149 pls. £8.50.

PRYOR, F. *Excavations at Fengate, Peterborough, England: the third report* (Northamptonshire Archaeological Society Monograph 1) (Royal Ontario Museum Archaeology Monograph 6). Leicester, Northamptonshire Archaeological Society and Royal Ontario Museum, 1980. xiv + 272 pp., 128 figs., 16 pls., 19 tables. £7.50.

PY, M. *L'oppidum Castels à Nages (Gard): fouilles 1958–1974* (Gallia Supplement 35). Paris, CNRS, 1978. 361 pp., 148 pls. Fr. 165.00.

RAGETTE, F. *Baalbek.* London, Chatto and Windus, 1980. 128 pp., illus. £9.50.

RAWSON, J. *Ancient China: art and archaeology.* London, published for the British Museum by British Museum Publications, 1980. 240 pp., 192 figs., 12 col. pls. £8.95.

ROUANET-LIESENFELT, A.-M. *La civilisation des Riedones* (Supplement à 'Archéologie en Bretagne' 2). Brest, 'Archéologie en Bretagne', 1980. 297 pp., 47 figs. Fr. 80.00.

ROYAL COMMISSION ON THE ANCIENT AND HISTORICAL MONUMENTS OF SCOTLAND. *Argyll, an inventory of the monuments.* Vol. 3. *Mull, Tiree, Coll and Northern Argyll (excluding the early medieval and later monuments of Iona).* Edinburgh, Royal Commission on the Ancient and Historical Monuments of Scotland, 1980. xlvi + 280 pp., 262 figs., 109 pls., 1 map. £52.00.

ROYAL COMMISSION ON HISTORICAL MONUMENTS (ENGLAND). *Ancient and historical monuments in the city of Salisbury,* Vol. 1. London, HMSO, 1980. lxiii + 199 pp., figs., 104 pls., 2 maps. £33.00.

RUSSELL, H. F. *Pre-classical pottery of eastern Anatolia: based on a survey by Charles Burney of sites along the Euphrates and around Lake Van* (British Institute of Archaeology at Ankara Monograph 2) (BAR Int. Ser. 85). Oxford, British Archaeological Reports, 1980. vi + 176 pp., 31 figs., 6 tables. £8.50.

RUTTER, J. B. and S. H. *The transition to Mycenaean: a stratified Middle Helladic II to late Helladic IIIa pottery sequence from Ayios Stephanos in Lakonia* (Monumenta Archaeologica 4). Los Angeles, Calif., the Institute of Archaeology, the University of California, 1976. ix + 71 pp., 34 figs., 17 pls. No price given.

SANDERS, W. T., PARSONS, J. R. and SANTLEY, R. S. *The basin of Mexico: ecological processes in the evolution of a civilization,* 2 vols. London, Academic Press, 1980. xiv + 561 pp., 12 figs., 12 maps. £28.80.

SCORPAN, C. *Limes Scythiae: topographical and stratigraphical research on the late Roman fortifications on the Lower Danube* (BAR Int. Ser. 88). Oxford, British Archaeological Reports, 1980. 219 pp., 25 figs., 57 pls. £9.00.

SHERRATT, A. (*ed.*). *The Cambridge encyclopaedia of archaeology.* Cambridge, Cambridge University Press, 1980. 495 pp., illus. £18.50.

TAYLOR, J. *Bronze Age goldwork of the British Isles.* Cambridge, Cambridge University Press, 1980. xiv + 191 pp., 43 figs., 62 pls., 6 maps, 6 tables. £45.00.

Thera and the Aegean world: papers and proceedings of the Second International Scientific Congress, Santorini, Greece, August 1978, Vol. 2. London, Thera and the Aegean World, 1980. 427 pp., illus. £32.00.

THOMPSON, F. H. (*ed.*). *Archaeology and coastal change* (Society of Antiquaries Occasional Paper (New Series) 1). London, Society of Antiquaries of London, 1980. 154 pp., 62 figs. £12.00.

THOMPSON, J. E. S. *Maya hieroglyphs without tears.* Reprint of 1972 edition published by the Trustees of the British Museum. London, British Museum Publications, 1980. 77 pp., 8 figs., 8 pls., 2 maps. £3.95.

TRIGGER, B. G. *Gordon Childe: revolutions in archaeology.* London, Thames & Hudson, 1980. 207 pp. £10.00.

WELLS, P. S. *Culture contact and culture change: early Iron Age central Europe and the Mediterranean world* (New Studies in Archaeology). Cambridge, Cambridge University Press, 1980. xi + 171 pp., illus. £12.50.

WILSON, D. M. *The Vikings and their origins,* new edn. London, Thames & Hudson, 1980. 96 pp., 115 illus. (25 in col.). £5.95; paperback £3.95.

PERIODICALS RECEIVED

Archaeoastronomy, Supplement to the *Journal for the History of Astronomy,* **10**(1), 1979. £5.00.

BIRLA Archaeological and Cultural Research Institute Bulletin, **2**, 1980. No price given.

Reports*

The Institute's Academic Board has decided that summaries of M.A., M.Sc., and Undergraduate reports should no longer be published in the *Bulletin.* Lists of titles will continue to be given year by year, however, and the first of these appears below. Anyone interested should in the first instance contact the Librarian of the Institute of Archaeology.

M.A. and M.Sc. Reports for 1979–80

Round structures in Minoan Crete	Lynn E. Bright
Environmental changes in the coastal blown sand deposits of the Orkneys	Louise M. Cavanagh
Patterns of transhumance: Qal 'Eh-I, Yazdigird, Kurdistan	C. J. Evans
Hellenistic terracotta female figurines from Syria with special reference to a group from Tell Nebi Mend	Miriam Mallon
Minoan peak sanctuaries	A. A. D. Peatfield
Clay tobacco piles from Bamenda (Cameroon)	A. N. Raymond
Line fishing in prehistoric Polynesia	R. B. Reeve
The Meini Hirion of Anglesey – an archaeological survey and analysis of the standing stones of Anglesey	Julie C. Wilson

B.A. and B.Sc. Reports for 1979–80

Conservation of some neolithic amber jewellery of Lieto Kikkarkosks, Finland	Leena A. Airola
Roman force pumps	T. W. Battersby
The continued occupation of Vaison-la-Romaine (Vasio) in the Later Roman Empire	Sara G. Beardsworth
The Anglo-Saxon sunken-featured buildings in Canterbury and London	P. Blockley
A study of an Iron Age lynchet, Bullock Down, Sussex	Anne F. Clarke
Ancient monuments of Gibralter	Ana M. Coelho
Musicians and musical instruments from situla art and their context	Jennifer E. Cope
Acid degradation of textiles	Julie Dawson
Aspects of the technology, conservation and storage of the Nimrud ivories in the collection at the Institute of Archaeology	Christine Del Re

* Reports are housed in the Institute of Archaeology Library.

An investigation into the distribution of non-flint handaxes in Britain, in relation to geology, drainage and glacial ice limits	D. Eagles
The wall plasters of Caerwent (Venta Silurum)	Beverly J. Fletcher
The excavation of Iskander in Jordan	C. B. G. Giffard
Analysis of Domesday population by fieldwork (area of Cirencester, Glos)	J. Harley
The Copper Age period in Malta (*c.* 3200–2000)	J. I. Hogg
The landscape location of megalithic chambered monuments in Anglesey: an indicator to life in the Neolithic	R. D. C. Holgate
A study of grave orientation in several Roman and post-Roman cemeteries in southern England	G. Kendall
The consolidation of archaeological bone in the field	S. P. Koob
The circulation of the provincial coins of Charles I: problems raised by hoards	P. E. Leach
The Dorchester Mint	W. M. Lean
Aspects of ale, beer and mead in antiquity	T. J. P. Malim
The role of sulphate-reducing bacteria in the corrosion of iron from anaerobic environments	I. F. Panter
The freeze-drying of organic material (with specific reference to the use of the 'Edwards freeze-dryer')	R. Payton
The teaching of archaeology in the primary school	P. Ann Pink
Roman locks and keys. Types, distribution and possible significance	C. R. Purkiss
Bird-bones	K. Rielly
Aspects of the Roman occupation of Valencia	P. Reynolds
Bone-work during the Palaeolithic in Europe: a review	Marie-Odile Saacke
Kilcoe Castle and Coppinger's Court – recording, interpreting and reconstruction of succeeding strongholds in County Cork	M. W. Samuel
Prehistoric settlements in Bodmin Moor, Cornwall: an experiment in morphological analysis	P. S. Smith
A comparison of the animal remains from two types of settlement site in north-west Pakistan	Gillian C. Taylor
Late Roman art and its connections	R. J. Tew
Archaeology of the Roman conquest period	S. D. Trow
Clothing in Roman Britain	Jacqueline A. Waller
Roman army standards	S. Walton
Burial patterns within settlements in the British Iron Age	Christine E. Wilson
The enzymatic extraction of papyrus from cartonnage	Margot M. Wright

The Contributors

Professor D. R. Harris, BLitt, MA, PhD, is Professor of Human Environment at the Institute of Archaeology, University of London, and Honorary Research Fellow of the Department of Geography, University College, London. His major research interest is the ecology and prehistory of human subsistence, with particular reference to the origins of agriculture.
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Cherry Lavell, BA, FSA, MIInfSc, was engaged by the Council for British Archaeology in 1966 to set up and run an abstracts service, and has just seen the fourteenth volume of *British Archaeological Abstracts* into print. This service entails the regular scanning of nearly 300 periodicals, over 60 irregular monograph series, and a large number of foreign publications relevant to the archaeology of Britain and Ireland.
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Christine E. Wilson, DipAD(Hons), BA, MSIA, is currently engaged in illustration work for archaeological publications. Her research interests are aspects of British Iron Age archaeology and methods of graphic representation of archaeological materials.
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Robin Holgate, BSc, graduated from the Institute of Archaeology, University of London, in 1980 and is currently doing research at Oxford University into the farming strategies, land use and settlement patterns in southern England during the fourth to second millennia BC.
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Paul Smith, BA, graduated from the Institute of Archaeology, University of London, in 1980. He is currently producing an environmental report for the Hayling Island excavation and continuing with his researches into prehistoric settlement location and land use in both the South-west Peninsula and the Northern Isles.
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F. A. Durrani, MA(history), MA(archaeology), is Professor of Archaeology at Peshawar University and has been actively engaged in the field archaeology of north-west Pakistan, with special interest in Bronze and early Iron Age archaeology.
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Notes to Contributors

Papers on any aspect of archaeology may be considered for publication in the *Bulletin.* All contributions and related correspondence should be addressed to the Editor, Professor J. D. Evans, Institute of Archaeology, 31-34 Gordon Square, London WC1H 0PY. The following notes are provided as a guide to intending contributors in the preparation of their material.

1) *Typescripts* should not normally exceed 10,000 words in length. They should be typed on one side only of A4 size paper (approx. 30 cm. by 21 cm.), using double spacing and leaving wide margins (at least 4 cm. on the left). Two copies of the typescript should be submitted, the author retaining a third copy.

2) *Footnotes* should be avoided as far as possible. If any are judged to be absolutely necessary, they should be typed on a separate sheet, not at the foot of the page to which they refer.

3) *Bibliographical references* should follow the so-called Harvard system. The author's last name, date of publication and number of page should be given in brackets in the body of the text, e.g. (Sharma, 1973: 129), or, if the author's name has been cited, simply (1973: 129). Full references should be listed alphabetically according to authors' names at the end of the paper. Where the publication cited is a paper in a periodical the title of the journal should be underlined and abbreviated according to the *World List of Scientific Periodicals.*

e.g. Paper: Sharma, G. R. 1973. Mesolithic lake cultures in the Ganga valley, India. *P.P.S.*, 39: 129–146.

Book: Butzer, K. W. 1972. *Environment and Archaeology.* London: Methuen.

Article in Book: Bordes, F. 1973. On the chronology and contemporaneity of different palaeolithic cultures in France. *The Explanation of Culture Change: Models in Prehistory* (ed. Colin Renfrew). London: Duckworth.

4) *Line drawings, plans and maps* should be drawn in waterproof black ink on smooth white paper, card, or good quality tracing paper or film. Lettering should be neatly done, either by stencilling or using self-adhesive lettering such as Letraset or Presletta, which should be varnished with the spray recommended by the makers to prevent damage. All line illustrations should be at least twice the intended final size, and of a shape suitable for reduction to full page (17 cm. x 12 cm.) or half page (8 cm. x 12 cm.) size. Line illustrations should be referred to as *figures* and numbered in Arabic numerals. The number should be written on the originals in soft pencil, and should correspond to bracketed references in the text, e.g. (Fig. 3).

5) *Photographs* should be printed on glossy paper and preferably be full plate or half plate size, depending on the subject and the intended final size. They should be referred to as *plates* and numbered in Roman numerals. The numbers should be written in soft pencil on the bakc in one corner, and correspond with bracketed references in the text, e.g. (Plate IX).

6) *Tables* should be numbered in Arabic numerals, but separately from the line drawings.

7) *Captions* to all figures, plates and tables should be listed on a separate sheet, and should be kept as short as is consistent with clarity.

8) *Radiocarbon dates* should be cited uncalibrated, using the convention bp, bc, ad to show that this is so. If calibrated dates are also presented, the convention BP, BC, AD should be used. Standard deviation and laboratory code should always be given.

9) *Abstracts:* a brief *résumé* of about 100–150 words should be supplied with each contribution, and will be printed at the end of the text.

10) *Submission date:* articles should be received not later than 31 December for inclusion in the following year's *Bulletin.* Articles will not be accepted unless complete with all illustrations, captions, etc. Twenty-five offprints of each paper published will be supplied free to the author. Additional offprints may be purchased at cost price; estimates of cost can be obtained on application.

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OCCASIONAL PUBLICATIONS SERIES

Problems of the Iron Age in Southern Britain, ed. S. S. Frere – 1978 905853-03-2 £7.50

This volume, containing the papers given at a conference organised by the Council for British Archaeology and held at the Institute of Archaeology in 1958, has been out of print for many years and has become much sought after on the second-hand market. It includes Mr D. F. Allen's seminal re-appraisal of the origins of British coinage, with his exhaustive 'Gazetteer of the Find Spots of Celtic Coins in Britain'.

Supplementary Gazetteer of Find Spots of Celtic Coins, by Colin Haselgrove – 1978 905853-04-0 £3.50

This supplement to Mr Allen's 1958 Gazetteer lists new finds since that date and the author has tried to make it as comprehensive as possible.

OCCASIONAL PUBLICATION 1 – 1977

The Tombs of the Middle Bronze Age II Period from the '500' Cemetery at Tell Fara (South), by D. Price-Williams 905853-05-9 £4.80

The Middle Bronze Age II cemeteries at Tell Fara were excavated by Petrie and his colleagues in the late 1920s. Characteristically he published the data from the cemeteries in note form shortly afterwards. The method of publication has led to the omission of much information about the individual tombs, so that a republication in a modern format is long overdue.

The present publication covers the MBII tombs of the 500 cemetery. All the extant objects that could be traced have been redrawn and regrouped. Information from the original excavators' notes has been included, as have the plans and sections of all the tombs.

The republication has revealed that the styles of tomb architecture at Tell Fara, one of the few sites where the tombs are cut in the MBII period, may be placed in five significantly different groups.

OCCASIONAL PUBLICATION 2 – 1978

Roman Military Diplomas 1954–1977, by Margaret M. Roxan 905853-06-7 £4.25

A collection of Roman military diplomas published since the Supplement to *CIL* XVI together with comments on changes observed in the use of abbrevia-

tions and formulae between AD 75 and the end of the second century. Indices have been compiled which will include all known witnesses and a chronological list of diplomas with dates corrected according to the recent work of a number of scholars.

OCCASIONAL PUBLICATION 3 – 1978

Research Problems in Zooarchaeology, eds D. R. Brothwell, K. D. Thomas and J. Clutton-Brock 905853-07-5 £4.50

This is a collection of papers on current research problems associated with the study of animal remains from archaeological sites. A wide range of topics is covered: vertebrate and invertebrate groups, the validity of methods in current use, the possibilities for new approaches, and the problems and potential of using modern comparative data. The emphasis throughout is on methods, analysis and interpretation. While aimed at the research worker, this volume should also be useful to students beginning in this field, and informative generally to archaeolgists.

OCCASIONAL PUBLICATION 4 – 1979

Pottery and the Archaeologist, ed. M. Millett 905853-08-3 £3.20

This volume contains the papers given at the conference organised by the University of London Archaeological Society in 1977 to celebrate the 40th anniversary of the opening of the Institute of Archaeology. The papers, by P. Crummy, I. Hodder, R. F. J. Jones, D. Miller, M. Millett, C. R. Orton, R. M. Reece, M. Spriggs, R. Terry and D. F. Williams, range over a variety of aspects of pottery studies all of which relate to methodological problems. The subjects are predominantly British, and several refer to the Roman period, although others consider interpretative insights provided by contemporary societies. The volume as a whole presents ideas which will be of interest to many working on pottery from sites of all periods.

OCCASIONAL PUBLICATION 5 – 1981

Excavations in Iona 1964 to 1974, by Richard Reece (with contributions by N. Balaam, D. Bramwell, G. W. Dimbleby, J. Graham-Campbell, A. Lane, Miss B. Noddle, Miss J. Sheldon, C. Wells, A. Wheeler and F. R. Woodward) 905853-09-1 £6.00

Rescue excavation took place on the early medieval monastic site on Iona over a ten year period. The results from these excavations are presented together with specialist reports on finds and environmental material of which the major contribution is a report by the late Calvin Wells on a group of human remains from Martyrs' Bay. The sites range from the sixth century AD up to the present.

OCCASIONAL PUBLICATION 6 – 1982

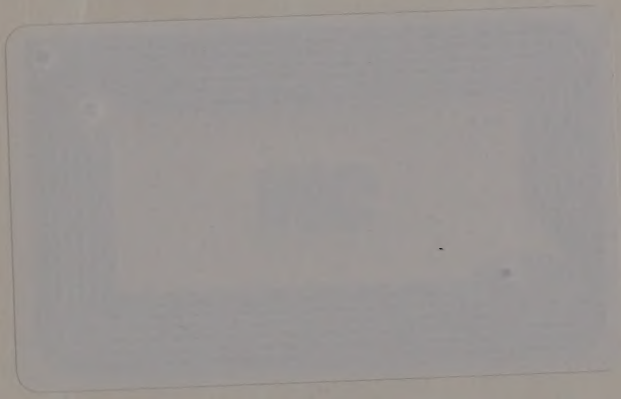
The Identification of Slags from Archaeological Sites, by H.-G. Bachmann £8.00
905853-10-5

This is the first scientific treatment of the problem of slag identification and interpretation in the English language. The author discusses the nature of slags, their chemical composition, conditions of formation and means of identification, in the first part of the monograph. There then follows a catalogue of typical examples of metallurgical slags, with details of the slag-forming reactions in various smelting and other metallurgical processes, profusely illustrated with optical and scanning electron photomicrographs to assist in identification. The phase composition of these slags is carefully described.

OCCASIONAL PUBLICATION 7 – 1982

Legionary Recruitment and Veteran Settlement During the Principate, by J. C. Mann £6.50
905853-11-3

This study deals with the origins of legionary recruits during the Roman principate and with the distribution of veteran settlements. Its basis is geographical and tables present the evidence in full for all provinces of the Roman empire. It is an essential complement to the work of scholars like E. Ritterling and G. Forni and throws light both on official policies and on the preferences of men themselves after discharge.



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